Summer

No 52 — November, 1986/$2.75*

EARTH GARDEN

EG lives!

- *Home energy systems* — NSW remote area power subsidy scheme, a super simple solar electric system, troubles with solar trackers and low voltage refrigerators. Build a home assembled 12 V fridge (and other cool ideas) or a 12 V record player (sound advice!).
- *The EG Interview:* Dr David Phillips, Only one earth (New Christian views on the ecology), Back to the trees.
- Marron in the backyard, intensive composting with earthworms, free fertilisers.
- Glazing skills (cutting glass & puttying), mudbrick pictures, build a wetback chimney.
- Plus: EG plans for 1987, Access, land lines, letters, people & places.

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EXPORT EDITION

EARTH GARDEN 52

Founded by Keith & Irene Smith, 1972.

Earth Garden is the original Australian journal of self reliance. It is intended as a forum of practical ideas, shared knowledge, sources and alternatives.

It's about putting a roof over your head, growing your own food, using alternative energy and surviving — and thriving — in the city or the bush and the inner changes which follow when you are in tune with nature.

Published and edited by Keith & Irene Smith.
©1986 by Earth Garden, PO Box 378, Epping, NSW, 2121.

We welcome advertisements appropriate to the aims and ideals of Earth Garden, but reserve the right to refuse ads at our discretion. Send SAE for display rates.

1987 subscription details — see page 58.

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The cover

Right: In NSW, a goodbye wave from us. *Top left:* In Tasmania, Philip Nicholas lays another mudbrick in his shed wall. *Below left:* In Western Australia, a succulent marron raised in the backyard by Richard Greenhalgh.

People & Places

It's goodbye from us (and some letters from our friends) 4
It's Festival time 9
The EG Interview: Dr David A. Phillips 10
Land lines: Land, homes, shares to buy or sell 14, 15, 43
Paradise wrecked, a warning from Graham Roberts 40
Farewell friends, by Rose-marie Loro 42
Letters: Communications from Planet Earth 54
And hello to them: Your new editors, Alan & Camille 58

Home energy systems

Energy Pulse: The solar race, 1987 16
Remote area power subsidy plan for NSW 17
Buyer beware!
1. When trackers ain't tracking, by Chris Martin 23
2. Solar electric fridges, by Greg Baker 24
A cool idea, by David MacMunn 25
Home Assembled 12 V refrigerator, by Dr Patrick F. Howden 26
Sound Advice — LV record player, by Laurie O'Donnell 38
Low voltage lights, comments by Peter van der Wyk 39
Sola 1: A super simple solar electric system, by Patrick Howden 51

Growing & small stock

The succulent marron:
. . . in the wild, by Dave Coleman & Richard Greenhalgh 6
. . . in the backyard, by Valerie Hopkins 7
Efficient compost, by David King 19
Intensive composting with earthworms, by Allan Mitchell 20
Free fertilisers, by Jacqueline French 22

Building

Mudbrick pictures (making, laying, cutting), by Philip Nicholas 28
Glazing skills (cutting glass, puttying), by Dr Robert Rich 33
Obituaries: Alistair Knox and Ken Kern 35
A wetback chimney, John Vukovich 36

The earth

Only one earth:
New Christian views on the ecology, by Jack Horner 44
Worthy work — the ATCV, No tree tax? 48
Back to the trees, by John J. Alderson 49

Food

Soymilk and nutmilk, by Dora Madgen 50

Access

Unclassifieds Marketplace 54
1986 Australian Access Directory
Birds, bush, smallholdings, food leaflets, radionics, ethics & more . . . 55

PEACE PRIZE: We were thrilled to hear just as this issue was going to press, that Robyn Williams of the ABC Science Show has been awarded a Media Peace Award for 1986, by the Peace Programme of the United Nations Association of Australia for his Palm Sunday speech (**Give peace a chance,** Earth Garden 50).

Dear friends

It's sad for us to say goodbye after 15 years, but we're happy to have at last found the right people to continue publishing Earth Garden.

We know our magazine plays an important role, keeping people informed about all the skills of self reliance and up to date with the best tools for leading the good life. From its small beginning in 1972, Earth Garden has developed into a popular forum for sharing experiences, swapping ideas, or finding your piece of Australia through land lines.

Alan and Camille Thomas will be the new editors and publishers of Earth Garden. They'll bring new ideas and enthusiasm to this established base. We know that you will encourage them, so Earth Garden will continue to grow from strength to strength. See page 58 for publication and subscription details for 1987.

We've made friends by mail with many people all round Australia. We'll miss the warmth we feel when we read your friendly letters each day. We want to thank you all, readers and contributors, for your vital support and your good wishes for our future. The letters which follow are extracts from just a few of many of these.

We wish all Earth Gardeners the very best for 1987 and the future. Well, goodbye and thanks for everything.

Peace & love,
Keith & Irene

Dear Keith & Irene

JENNY BENNET, Mutarnee, Qld: I have been an avid Earth Gardener for many years, eagerly awaiting each magazine. I would like to thank you both for the many happy hours, ideas, thoughts, enthusiasm and encouragement Earth Garden has given me. It has been like having a quiet friend.

SHIRLEY KEOWN: Christchurch, New Zealand: Your magazine has been a great inspiration to us and it has been a highlight of the day when a new issue arrives. Pleased you've decided to do what's important to you both while you're still fit & able.

MERALYN ROBERTS, Mannerim, Vic: Thanks from our family for 15 years and 51 copies' worth of various forms of 'sustenance'. As contributors on our own mudbrick ventures nine years ago, we have always proudly associated ourself with Earth Garden and met many people as a direct t result.

RAY ENSLEY, Highton, Vic: Although I must remain in suburbia for another two to three years to do things that I feel must be done, Earth Garden has helped prepare us for the move we intend to make.

Our suburban block is really unsuitable for vegetable gardening or fruit trees on a reasonable scale, but we have managed to learn some skills. Most recently, and encouraged by an item in Earth Garden, we made a portable chook run and this week have obtained our first eggs from our two hens.

What I am trying to say is Thank You, most sincerely, for your magazine — competing magazines are not the same.

VIRGINIA TABRETT, Cardross, Vic: Thanks for your inspiration, advice, support, inventiveness, fund of knowledge and hours of absorbing reading. Best of luck for the future.

MARCIA MULDER, Wallsend, NSW: Earth Garden will always remain a favoured magazine in our home and all copies occupy pride of place on the bookshelf. Back in the spring of 82, I was feeling rather despondent. I happened to pick up a copy of Earth Garden in a stroll through a newsagency and upon returning home read and re-read this fascinating little magazine from cover to cover.

Articles in Earth Garden led me to contact an organic growers' group (of which I am now secretary), introduced me to the Steiner method of education (which has revolutionised our life), opened the door to many crafts and taught both myself and family the necessary skills to take on projects not before contemplated.

I can confidently say Earth Garden was the catalyst in changing me from a narrow minded, self centred suburban into a person with a desire to explore the many simple pleasures obtained by good hard work — whether it be maintaining the vegie patch, embarking on some craft project, or just enjoying the satisfaction of being relatively self sufficient. Once again, sincere thanks for all you have given.

GLEN PRYCE, Lockhart River, Qld: I'm sorry to hear you are giving up Earth Garden after all these years. You have done a marvellous job and helped a lot of people I am sure. I myself started reading Earth Garden nine years when I was 14 and way back then, I thought, this is the life I want to live. I am now living a simple lifestyle , in tune with nature, growing my own food and enjoying life.

You have led a lot of people up the Earth Garden path to a better lifestyle.

MARGARET VINSON, Port Pirie, SA: I only started to read EG (in a doctor's waiting room) about three years ago. Right from that very first glimpse, I knew it was the most wonderful magazine on the market and promptly ordered all the back copies.

I have not chosen the alternative lifestyle, but I like to read about it and know that it is there and how one can manage if one is young and healthy enough to cope with the strenuous labours involved. I shall treasure my set of EG. Who knows, maybe my grandchildren will choose the latemative lifestyle?

I hope you find someone with the expertise and capital to continue publishing Earth Garden as this world *needs* such a magazine. A magazine which not only tells you the alternatives, but gives you step by step instructions on how to obtain them. I thought the type of advertisements you have been accepting and publishing in the last few issues are really good.

Thank you for giving so much to so many, through EG.

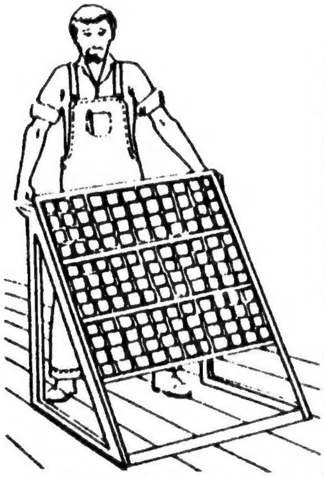
JOHN SYMES, Ovingham, SA: I've been reading Earth Garden for yonks. Probably bought EG1, but with various house shifts, I've lost them all, so I have decided to treat myself to a 50 issue orgy of stimulation, interest and reference. I find your mag. a constant source of delight and refreshment. Thanks for all your efforts over the years.

HEATHER CHAMBERLAIN, East Gosford, NSW: Earth Garden was a breath of fresh air in the early days. How nice it was to find that my family, and especially me, weren't mad after all with our desires to be out of the rat race! And later, the contents became more comprehensive and there were great 'theme' issues too — *Trees* and *China* are my favourites.

And always, there were letters and articles from those having trials and joys doing what I longed to do — keeping my dreams alive. So, thank you, thank you and very best wishes for the future, whatever your plans.

EARTH GARDEN BOOKS

Orders to PO Box 378, Epping, NSW, 2121, until December 31, 1986.



ENERGY WORKS!

Home Energy Systems

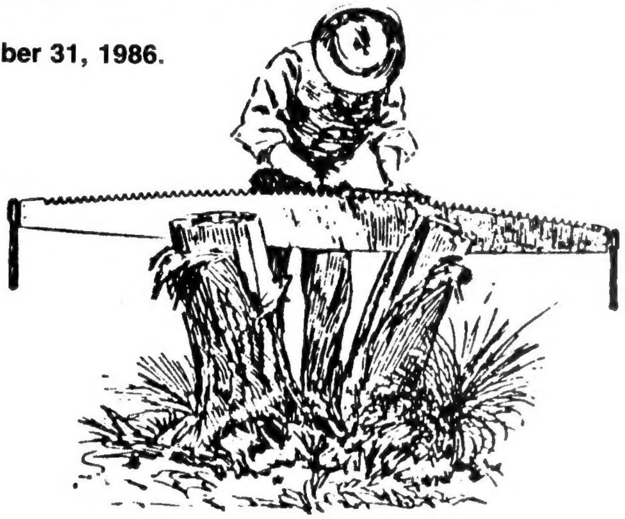
By Keith Smith

Nelson, Melbourne, 1985, large format paperback, 211 pages, illustrated. ☐ $19.95 posted.

Why spend the rest of your life paying someone else for your electricity? Here's how to plug in the renewable energy of the sun, wind or water using an efficient 12V or 240V solar electric system, wind generator or water turbine. Run lights, radio, TV, computers, tools and appliances wherever you live.

"The major part of this book is devoted to practical issues, hardware and actual installations.

". . . This book should appeal to anyone wth an interest in the supply of energy to weekenders, farms or other remote dwellings or even to the suburban household." — Dr C. J. L. Cornish of Murdoch University, WA, in *APACE WA Newletter.*



The Settler's Guide

Old time skills and bush lore

Compiled by Keith Smith

Nelson, 1983 (second printing), large format paperback, 176 pages, illustrated. ☐ $15.95 posted.

Pioneer a bush block from 'go' to 'whoa'. How to clear, fence, square a gatepost, whitewash, build a slab hut, a rammed earth house or a timber windpump with hand tools. Harness horses and select, sharpen and care for bush and bench tools like axes, adzes, planes, crosscut saws, mauls and scythes. Tried and true advice from *The Agricultural Gazette* of NSW, 1890-1910.

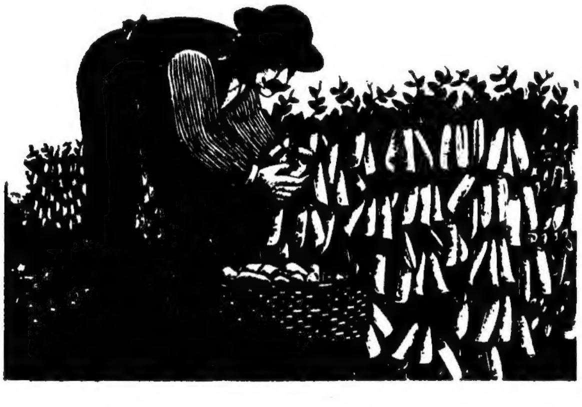
Third Earth Garden Book

Edited by Keith & Irene Smith.

Nelson, 1981, large format paperback, 256 pages, illustrated. ☐ Special $5.50 posted.

A collection of practical, original, human-scale methods for providing the essentials of life, with stories from New Settlers on farms and communities all around Australia.

The Third EG Book tells you how to build fences, gates, a concrete water tank, plastic greenhouse, Coolgardie safe and compost privy; how to spin and weave, make rugs, dilly bags or baskets; how to build your house from earth, stone or timber; how to raise coloured sheep, freshwater fish or yabbies, or grow permanent tree crops and protein-rich legume crops.



HARD TIMES HANDBOOK

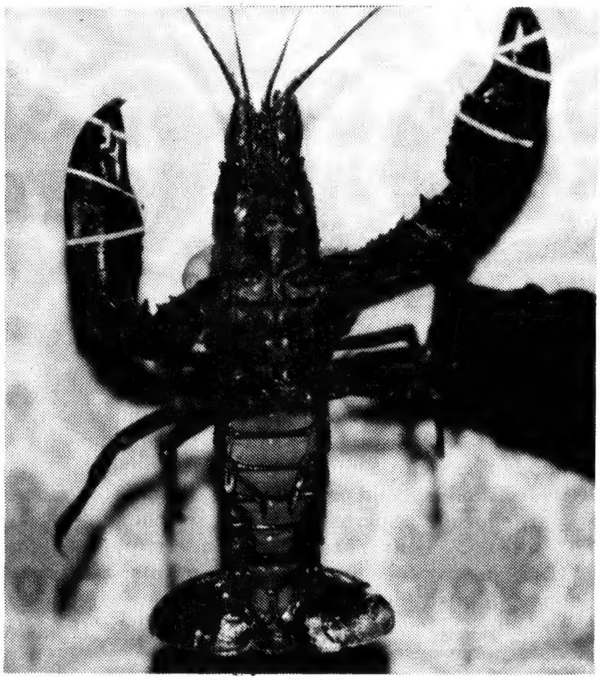
Survive — and thrive!

Keith & Irene Smith

Nelson, 1986, 204 pages, 70 illustrations. ☐ $8.50 posted.

This is the second, corrected edition of our practical book of skills, strategies and short-cuts for urban survival. HARD TIMES HANDBOOK outlines a new, self-reliant approach to city living. It tells you how to do more with less, be prepared for food shortages and emergencies, save energy, make money without a job and manage your food supply. Make bread, yoghurt, soft cheese, candles and soap. There are 150 recipes for cheap, healthy tucker and 180 money-saving household hints.

The succulent marron



THE MARRON *(Cherax tenuimanus).*

Some tasty freshwater crustaceans lurk in the still and slow moving waters of Australia. In the east, there is the yabbie (*Cherax destructor*), chronicled by Ian 'MacYabbie' Carstairs in **Earth Garden 25.** The freshwater crayfish (*Euastacus armatus*) inhabits the Murray-Darling system and in the north, the freshwater prawn (*Macrobrachium rosenbergi*) is widespread.

In Western Australia, the marron is the freshwater crustacean most likely to succeed in farm dams or backyard pools and tanks. They say it's tastier than the marine lobster and it doesn't burrow or bore holes through dam walls like the yabbie.

We asked Dave Coleman, convenor of the Permaculture Association of Western Australia (PAWA), to confer with Richard Greenhalgh for our first article on marron in the wild. Our second article on backyard marron is adapted from a report by Valerie Hopkins, editor of the **PAWA Newsletter,** on a talk by Richard Greenhalgh at a PAWA open day and a visit to Richard's 'marronry' at Morley and is reprinted with permission from the PAWA Newsletter, May 1985. Send SAE for membership inquires to PAWA, PO Box 430, Subiaco, WA 6008.

- Leaflets on marron, including **Marron In Farm Dams,** are available from the Department of Wildlife and Fisheries, 108 Adelaide Terrace, Perth, WA 6000.

MARRON IN THE WILD

By Dave Coleman & Richard Greenhalgh

Marron are adaptable and capable of being a good, healthy food supply if we take care of the environment to allow them the conditions they need to live and breed.

This article has been put together to encourage the knowledge required to help preserve the marron in its own habitat and not to instigate free food hunters to flock to the nearest river or stream reserves.

Marron in the wild need to be left alone to forage in the cool waters of the southwest of Western Australia and allowed to live and breath in clean waters unaffected by the unnecessary applications of fertilisers, phosphates, herbicides and pesticicides that so many farming industries use. Salt in rivers, we know, has been brought about by clear felling and broadacre farm methods, but these trends are changing back to more natural, cheaper, healthier and more productive ways.

Marron need oxygen in the water just like fish, but polluting the water with fertiliser creates supergrowth of algae due to the nitrogen given off. Mandurah Peek Inlet and many other areas are affected this way. True plants and algae produce oxygen during the daylight hours, but use up twice as much during the night. Marron soon become disturbed if the environment is not to their liking and will go walkabout and find a more suitable spot if possible. Unfortunately this leads to many dying in the wild and numbers becoming so depleted that the species could be in danger.

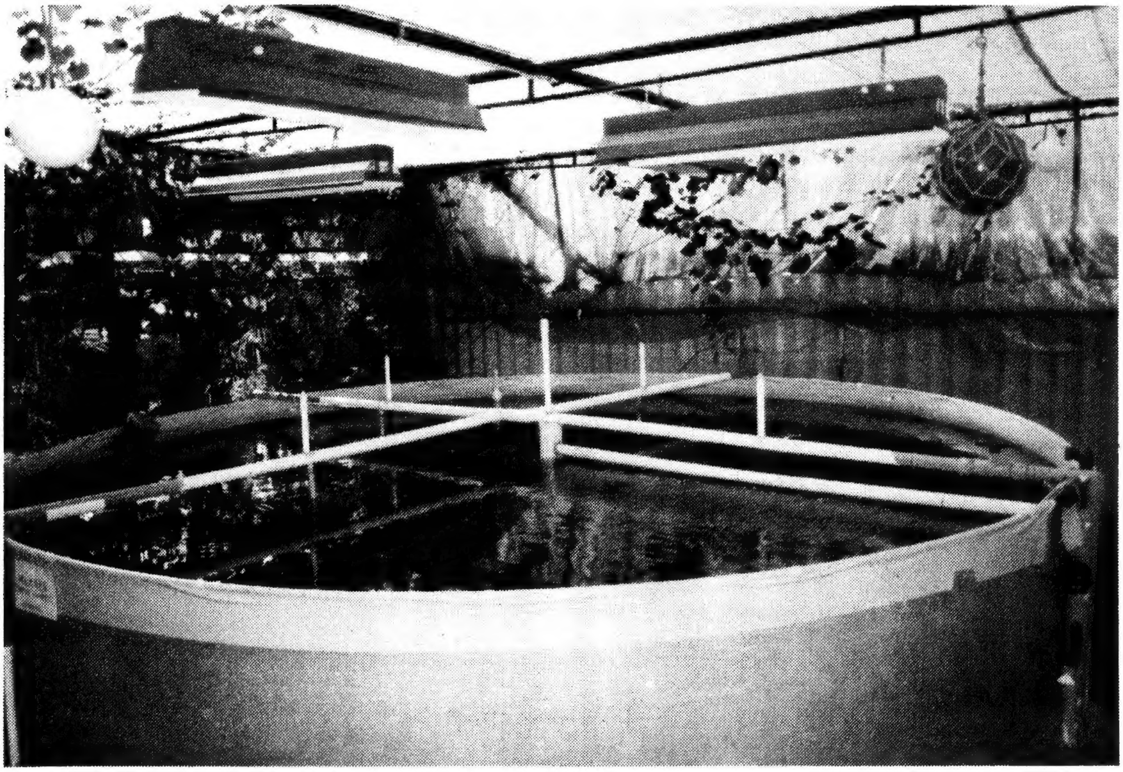
Marron farming is their saviour and the crustaceans are becoming a major export product. The Americans and Japanese are very interested in marron as a food supply and buy as much as we can produce. It is the third largest freshwater crustacean in the world, only beaten by the Tasmanian freshwater crayfish and the Murray River crayfish

Its flavour is far superior to any of its rivals and some chefs say it is equal to any other shellfish. Specialists in marron culture from Western Australia have made trips to China, Africa, Europe and the United States to advise and sell this succulent product.

How and when do marron develop best? Well, they do like the natural bush environment and will grow to an enormous 1 kg if left to do so. Cool, fresh unpolluted water, 12° C to 24° C in temperature, flowing gently, is desirable.

Dams are suitable for marron if the oxygen level can be kept up by a windmill or some other form of aeration system. Salinity does affect them and they will move away from affected water, but can tolerate quite high levels over a short period. They like sheltered river banks and live quietly under branches and reeds and can often only be seen by torchlight at night.

Overcrowding in cultivated conditions leads to



cannibalism during the moulting season, when predators take advantage of marron removing their armour.

Mostly they survive on the rotting vegetation going on in a stream as well as small bugs and worms. Farming marron involves feeding them a carefully prepared pellet similar to the chook pellet, but any contamination in the the feed can wipe out an entire stock.

Marron are kept by city folk in their suburban gardens in pools made specifically for breeding and keeping them. One enthusiast is Richard Greenhalgh who has a beautiful pool he constructed with family and friends and a superb research laboratory set out with tanks, pumps and filter systems so he can create the necessary environment for his many pet marron and similar species like yabbiies, touggies, crabs and mussels and fish.

If marron are to survive the onslaught of man into the forests of Western Australia, we must allow them room to breathe in unpolluted waters. When marron are prolific in the wild again, we will know that we humans have cleaned up our act.

BACKYARD MARRON

By Valerie Hopkins

There are 15 species of land crustaceans in Western Australia. The best known are the marron, gilgie and koonac. The marron, the biggest freshwater cray in the state, nevertheless can tolerate quite a bit of salt in their water.

Pools. Marron can be raised in anything from small plastic wading pools of 2 metres diameter, upwards, to the larger concrete ponds. Richard Greenhalgh has a 15 ft above ground pool (which has a higher water temperature) and a similar sized concrete below ground pond (which has a colder water temperature) and he pumps the water through a filter, from one tank to the other, to alter its temperature when necessary.

He also has several smaller ponds and numerous banks of glass tanks, because he does a lot of experimentation with other species. The entire area is protected with a large shadehouse structure, covered with canary wire with shadecloth over it (to prevent excessive summer water temperatures) and plastic. There are also grape vines over the wire and passionfruit vines on the walls.

We were fascinated by the fact that the whole setup cost very little, as all the materials were either secondhand, or obselete stock.

Filters. Sand filters are used, also fresh water mussels which are biological filters (puts you off eating them, doesn't it?).

Some sort of drainage system is essential in the ponds as regular cleanouts are necessary. A soft bottoming material, such as a coarse sand/clay/limestone mixture is needed to stop claws wearing out and ulcers forming on the marron's stomachs.

Aeration. Water can be aerated by a recycling waterfall type of operation; or a paddle wheel, driven by a windmill or electricity, works very well.

Water. Don't use tap water unless you de-chlorinate it first ... by efficient aeration. With bore water you need to let it settle for a week to de-ionise it. Rainwater is collected in winter and used and *azolla* weed (an aquatic fern) is grown on the water surface to absorb nasties (chemicals).

Shelter is needed for the marron to provide hiding places for moulting (they moult once a year when adults). Onion bags can be hung strategically and short pieces of PVC pipe placed on the bottom of ponds. Floating islands, made up of polystyrene sheets or old plastic crates, serve the dual purpose of shelters and feeders. Onion bags hang all around from them like a skirt and the marron use these for a ladder.

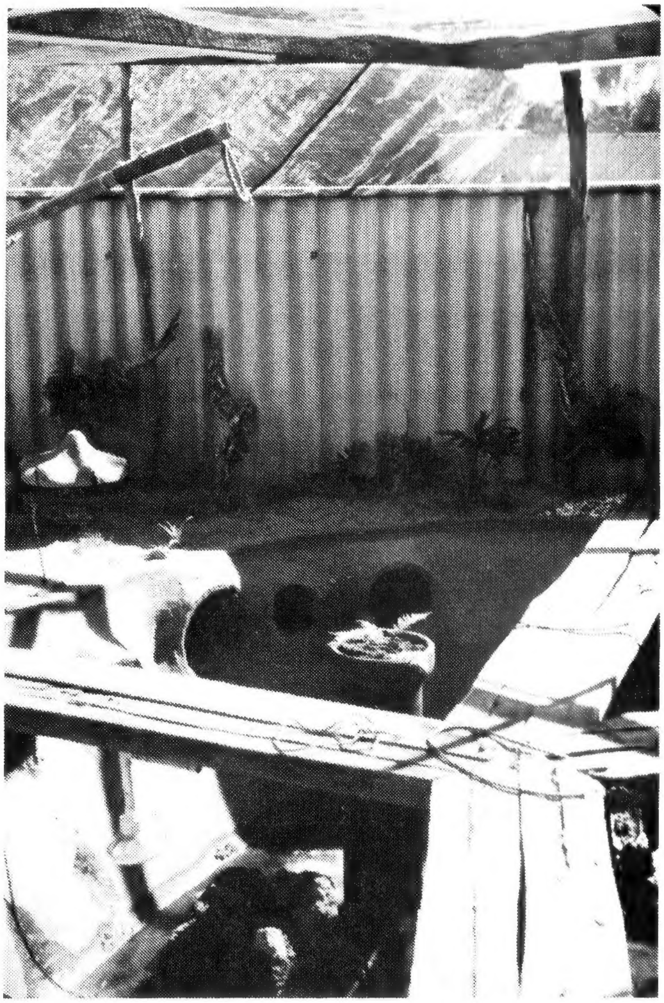
On top compost and grass clippings (thoroughly washed clean of any sprays) — and any grasses grown that will germinate — serve as a medium for red bloodworms (midge larvae, excellent marron food) to live in. Richard calls the worms *Kamikaze worms*, because they often drop off down to the tank bottom. The islands allow the marron to come up to the top to get rid of lice, but gambusia fish (*Gambusia affinis*, also called 'mosquitofish') are also stocked to pick off the lice.

Breeding. Buy small marron each year in January for three years. They will breed in the third year and there is no need then to buy more. After that, fish out — and eat — all the big ones each year.

Official notes advocate one male to five females, but one to two is better. Smaller mothers are best as they have more arms left to care for the berries (large, yolky eggs). They carry them for three months and they spawn in September. Females always keep their tails tucked under when in berry. Egg amounts depend on the size of the female: first year (3 years old) up to 300 eggs; second year (4 years old) up to 600 eggs; bigger ones up to 900 eggs.

Parents and young should be separated as soon as the young are released (they may eat the young). Richard uses a special floating 'midwifery lodge' made up of bits of old plastic bread crates, in which the young can float off through the holes and the mother can be easily removed to another pond. The lodge has 'all mod cons', such as a piece of PVC pipe for a hide and a piece of matting on half the floor for holding the food.

Feeding. Trout pellets are okay, but use chook pellets only at a pinch. Red bloodworms are the best feed and fish roe for the babies. Be very careful of lucerne pellets, they can be deadly if the lucerne has been sprayed. A variety of food is needed, but excessive feeding will pollute and cause mass deaths. If dead marron or prawns are used as feed, pull them out if they are not eaten the same day.



The Freshwater Aquaculture Book

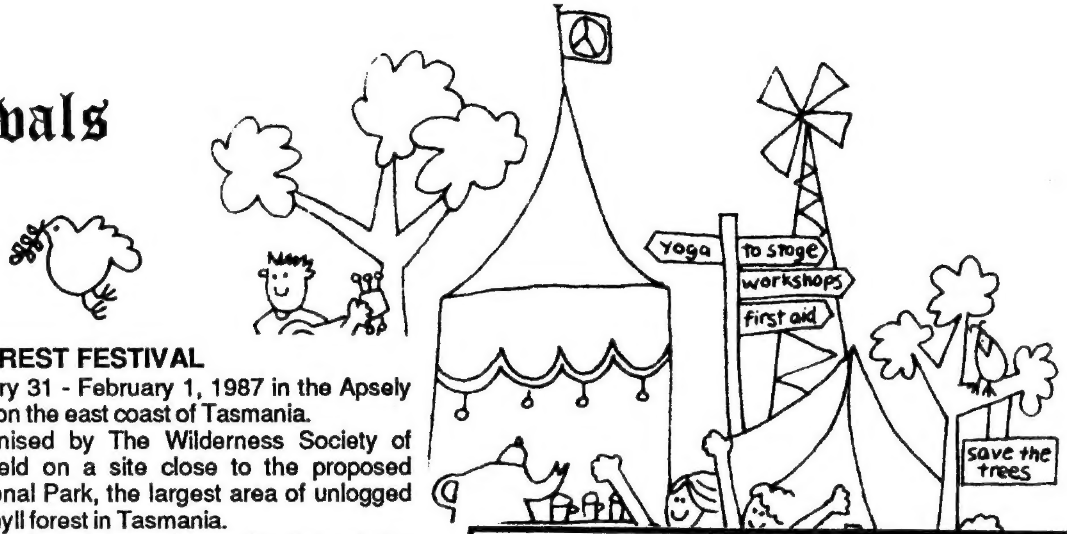
A handbook for small scale fish culture in North America

William McLarney, A Cloudburst Press Book, Washington, 1984, hardback, 583 pages, illustrated. Price $60.

An impressively thorough book, more specific and useful and (despite its price) much cheaper than the encyclopedic *Aquaculture* written by William McLarney, John Bardach and John Ryther and published by Wiley Interscience.

Neither yabbie, nor marron, nor Australian native freshwater fish are dealt with, but there is an excellent section on raising freshwater crayfish and the culture of dozens of fish species is detailed thoroughly. With these reservations, it seems an invaluable reference for the serious aquaculturist. Ask your library to order from Second Back Row Press, P.O. Box 43, Leura, NSW 2781.

Festivals



TASMANIAN FOREST FESTIVAL

Weekend of January 31 - February 1, 1987 in the Apsely Valley, near Bicheno, on the east coast of Tasmania.

The festival, organised by The Wilderness Society of Tasmania, will be held on a site close to the proposed Douglas-Apsley National Park, the largest area of unlogged and unburnt schlerophyll forest in Tasmania.

Activities planned include interpretive walks through the proposed park, workshops on ecology, bushcraft and non-violent and political action to save Australia's diminishing native forests. There will also be an outdoor concert and displays of other threatened forests in Tasmania.

Further information from The Wilderness Society, Northern Regional Office, 34A Paterson Street, Launceston, Tasmania 7250.

MOORA MOORA FESTIVAL IS ON AGAIN

Midday-midnight, Saturday, February 28, 1987.

Breathtaking views of the Yarra Valley, with Melbourne in the distance. Beautiful native bush, lovingly cared for and encouraged to regrow where previous logging and fire had destroyed it. Peaceful farm scenes with sheep, cattle and horses grazing. Several wind turbines of different designs, solar heated water and solar electricity, lovely mudbrick, rammed earth and timber houses.

A thriving community which has been going for 13 years. This is the Moora Moora Co-operative, 16 km from Healesville, near Melbourne.

Each year the Moora Moora Festival has been a great family day. There will be workshops, demonstrations and activities reflecting the interests and knowledge of Moora Moora members: building, crafts, wind and solar energy, health and the community school. There will be rides and other activities organised for children, music all day culminating in a bush dance and lovely, wholesome food for sale. Tours of the place will show new developments on the many unusual houses.

Cost, including the bush dance, all workshops, tours and other activities will be $18 family, $8 adult and $4 concession or child.

D.T.E. CONFEST 1986/1987

The 10th anniversary Down to Earth Confest will be held at Boorhaman, about 10 km north of Wangaratta, Victoria, from December 30, 1986 - January 3, 1987.

This year a Rural Skills and Crafts Village has been added to the usual workshops on alternative technology and permaculture, food stalls, dancing and music. Bring camping gear, utensils and torches. Don't bring pets, disposables, gas or kero lights or candles (Fire laws).

Admission prices: Early bird admission, $25, gate, $40 and concession (with proof), $35. Maps will be provided with pre-purchased tickets. Send payment cheque or SAE for further information to D.T.E. (Vic.) Co-Op, Box 1234, North Richmond, Victoria 3121.

ORGANICALLY GROWN

EAST GIPPSLAND ORGANIC AGRICULTURE ASSOC

AUSTRALIA DAY ORGANIC FARMING SCHOOL

January 24-26, 1987

Venue: Camp Coorong, Banksia Peninsula — on the shores of beautiful Lake Victoria, just 10 minutes from Bairnsdale.

Full weekend program — lectures — workshops — farm tours

Including:

PAT COLEBY — Organic approach to animal care
IVAN LAZLO — Some useful legume and nut trees
CHRIS ALENSON — Organic ways to soil fertility — for plant and human health
VERN LAWRENCE — Keylining & rock dust fertilisers
JENNY LEEREVELD — Scientific basis for some organic pesticides
WALLY PORTER — Small scale farm & garden design using permaculture principles
Also mineral fertilisers, agroforestry and much more. . .

Unpowered campsites available
Cost (including camping fee) — $28.00 per head
No charge for dependent children
Some appropriate commercial sites available

For information & bookings, write to the Association, C/- Audrey Porter, PO WISELEIGH, VIC, 3885. Ph: (051) 57 5210

THE EG INTERVIEW:
Dr David Phillips

Man know thyself; then thou shalt know the
Universe and God.
PYTHAGORAS, 598-504 B.C.

It seems as if he has done it all. Dr. David A. Phillips has been an electrical engineer and an organic farmer growing paw paws at Palmwoods in Queensland. He has studied philosophy, health, nutrition and numerology. He gained his Doctorate in Philosophy in Natural Science in 1971 with a thesis on the relationship between vegetarian and dietary habits and human health.

He qualified as a yoga teacher in 1969 after a course with leading master Swami Vishnu-devananda at the Shivananda Ashram at Val Morin in Canada. His search for knowledge has led him to study with revered teachers of ancient wisdom in Egypt and the Middle East, with Pythagoreans in Greece and with spiritualists in Brazil (a country, he says, where there are 10 million practicing spiritualists) to investigate the teaching of reincarnation.

He is the author of several books, notably *Guidebook to Nutritional Factors in Food*, *From Soil to Psyche, Secrets of the Inner Self* (on numerology) and his latest, *New Dimensions in Health* (a wholistic guide covering everything from organic farming to the purpose of life).

Though he is very much a product of the New Age, David Phillips has a track record as an astute and successful businessman. In 1968 he founded Hygienic Food Supplies, which pioneered the distribution of organic produce and natural health foods in Australia. We are grateful for his help with sales of Earth Garden in its early years. When Publishers Distributors (with Shirley Baudinet) took over our mail orders, we gained a 'sabbatical' year of travel in 1979.

Currently David is a 'born again' businessman with his fiancee, Delwyn Glen, as his partner in a new company, Aquarian Book Distributors, incorporating Norganic Foods of Australia, which employs a staff of 22 people at its headquarters at Alexandria in Sydney and has representatives in five states.

At the age of 52, clear eyed, fit and vital, David Phillips continues to find life an exciting adventure — and he is still 'doing it all'.

For the numerologists who are reading this magazine, his birth date is February 12, 1934.

Keith & Irene: We know you, David, as the principal of Aquarian Book Distributors, as a person concerned with nutrition and the ecology, and as an author of many books on those subjects. We know that you are a vegetarian and fast occassionally, and that you have lectured in the United States on health, nutrition and organic farming.

As well as that, you've pursued a successful business career which, in our view, has done a lot of good for the Australian community. First, we would like to know what got you into it ... what started you off on this life?

David Phillips: Yes ... my commencement was on graduating from electrical engineering, which gave me a realisation that I was never cut out to be an engineer. Having a good brain and a good memory helped me to graduate. It didn't qualify me to be a good engineer, but I learnt in my engineering degree that I was very interested in people and human reactions to environment and to external stimuli, even to other people.

And so I did some post graduate work with Philips Electrical in industrial and medical electronics, which varied from the influence of music in the selling place to the effect of horrid memories on people's brain cells. The variation came about when I was down in South Australia doing some research into the effect of music — background music — to stimulate increased selling. It hadn't been done before and I'm going back now to the mid 1950s. There was no thought then that background music would have any effect, except to detract from sales, and yet we found on experimentation that the companies that put in background music actually had greatly increased sales, because people felt freer to talk. They didn't have a silence behind them, they had a comfortable ambience. It didn't impair but rather increased sales.

That's one end of the spectrum. The other end was doing some work on electro-encephlography with Dr. Harry Bailey at Callan Park with people with disturbed mental functions. These were the days when they were doing pre-frontal leucotomies, when they would cut from the front lobe of a person's brain the cells which were considered to hold bad memories, that created personality disturbances. The problem was that there was only a 50-50 chance that there would be an improvement and an equal chance that there would be a deterioration in the personality. And there were some deaths.

My involvement certainly wasn't on the surgical side, but rather with the equipment that was being used, the cathode ray oscilloscopes that were used to test the brain waves on these troubled cell areas. I learnt that there was a tremendous relationship between people, or the individual, and the food they ate. And I started applying my studiws, because I like mathematics and I like numerology — which I'd then just become exposed to — to the fact that you could use the numbers of one's date of birth to understand what makes a person tick, what their characteristics are, what their pathways in life are.

That's very interesting. Was that derived from Pythagoras originally?

Yes. He was the father of mathematics and he defined mathematics as a system by which the unknown became known, using symbols. And the symbols were numbers. He used numbers not as symbols of *quantity*, but as symbols of *quality*, so it was called qualitative rather than quantitative mathematics, not comparitive maths, but absolute maths ... Mathematics with a capital 'M'.

And some aspects of nutritional diet go back to Pythagoras?

Well, in studying the philosophy behind numerology, I found that this man was a vegetarian. He practised food combining and he taught total reverence for animals. He called his teachings 'philosophy'. He was the first person in the world to use the word 'philosophy', which was the study of universal truths and the love of truth and wisdom. He found that in study of philosophy that it could be encapsulated in a system called the *Ten Mathematical Disciplines* , of which fasting and dietetics were the eighth. These ten disciplines are detailed in my book, New Dimensions in Health. They combined to form one of those very vital parts of life that helped people to gain, as he termed it, 'empire over the self'. Compassion was the sixth and compassion, of course, is what we find in organic farming.

So, Pythagoras has been a strong influence on your whole outlook?

An extremely strong influence.

How many years ago was it that you discovered him?

That was 1955, the year before I graduated. I'd just finished my final exams in electrical engineering.

And you went on to do a Ph.D?

... In Nutritional Science. I tried to get into Macquarie University, because it had a liberal constitution and hadn't long been formed then, but in their School of Philosophy under Professor Deutcher, they were not interested in ancient Greek philosophy, nor the philosophy of the foundation of Western culture. They were interested only in modern philosophers, whom I call 'logicians' anyway, disrespectfully.

So I studied through the External Board of London University for my Ph D in Nutritional Science. I did it by external examination, from here, but I did my internship in Florida in a fasting institute.

Did that form your link with the United States?

I first went to the United States in 1969 to study organic farming techniques. At that stage I had only owned the Palmwoods Organic Farms (in Queensland) for a year. But with a lot of early theory and this year of practice, I found on going to the United States and talking to the organic farmers and even the hobbyists, that I didn't know any less than they did. So when I went to conventions, I found myself on the platform lecturing, especially with the layer mulching technique which we developed. This was basd on the Ruth Stout 'no-work' garden system. Of course I espouse that in great detail in *New Dimensions in Health* . That layer mulching technique was something that few people had heard about, let alone practised. They found that this was vitally interesting to them, because not only did I talk about organic farming, but the importance of internal organic farming, looking after you diet by choosing the right food.

Chemical-free crops and chemical-free foods! And where did you get the ideas that you put into practice at Palmwoods in those days?

Oh, by studying Rodale [J.I. Rodale founder of *Organic Gardening* magazine and Rodale Press of Emmaus, Pennsylvania, U.S.A.] ... primarily Rodale books, *The Encyclopedia of Organic Gardening* , the *Ruth Stout No-work Garden Book* , *Companion Plants* ... and a hell of a lot of practice, blood, sweat and tears through experiments with various food crops.

I did a long fast in early 1968, long for me — it was two weeks — with total rest and nothing but water and in two weeks only one pint of water. As I came off the fast, I started to realise how sensitive my palate was to impurities in food, to sprays on the skin of grapes, to the taste of the peel of orange. I thought, well there must be other people like this. Why can't we get good foods that are chemical-free?

On enquiring, there weren't any available in Australia. So I decided that I'd look around and talk with the people I was fasting with, that was Dr. Alec Burton, who knew of one or two organic growers, Fred Steed at Coffs Harbour and a fellow named Ron Bush up at Palmwoods. So I called on these two people and met others on the way. Ron Bush was in the process of selling his farm. I just happened to be there and it was the right time to buy it.

The right place at the right time!

I paid an arm and a leg for it. In those days I didn't realise how much I'd been taken down. I bought a farm with a view and very poor topsoil. So it was a good challenge. It was an organic farm because he was a lazy farmer. I had a partner named Graham Ferguson and he worked it full time and I used to go up there and work it whenever the time permitted. Meanwhile I had to get the distribution business going down here to sell organic produce. Because I was secretary of the Natural Hygiene Society and *Hygea*, or Hygiene, was the name Pythagoras used for the science of health, I called it Hygienic Food Supplies. I started business on April 14, 1968 in the garage of our home in Carlingford (Sydney).

So how did that build up into distributing health foods and books?

I went overseas in 1969 to go to the organic growers in California and get the Covalda dates and see the Jaffe Brothers at Valley Center for their organic produce and I heard of the organic cashews that were available in Africa, in Tanzania ... though I didn't get there until 1971.

I found then that to buy quantities to make it economically viable to bring into Australia they had to be huge quantities. They had to be pallet loads and multiple pallet loads. We started with this and then found that the only economical way to do it was in full container loads. So we decided that the only way to do that was to go beyond our 400 or 500 direct customers and wholesale. So in 1971 we started to wholesale to the health food industry.

Did you find a lot of resistance?

It was totally new to them ... a little scepticism, a little uncertainty, but not resistance as such. There was total ignorance, because the health food industry then really consisted of 400 or 500 shops throught Australia. These health shops used to sell coffee and chocolate and all sorts of interesting things that were anything but health foods. There were exceptions like Vince Russell who was the Honey King in the Queen Victoria Building and there was Norm Howarth in Burwood who had a bulk food store.

So the natural foods side of the health food industry hadn't started ... and we pioneered it, because our total range was organically grown products.

We started with Norganic Foods of California in January 1970. I was lecturing at the U.S. Natural Health Federation Convention. In fact Adelle Davis was on the programme, Paul Bragg, Bernard Jensen ... and me. I first came across these cold pressed oils that were free of chemicals and preservatives, the Norganic oils. I looked around and thought, if there's Norganic, there must be others. I checked the others out, but they had all sorts of ingredients added to them, so I stuck with Norganic and bought them into Australia.

Norganic was a little company, owned by one man, operated by one other. I became their agent and we grew together. Even when I sold Hygienic Food Supplies in 1979 and left the company in 1981, I still maintained my position as their personal representative in Australia, checking on the correct distribution of their products. Then the company that eventually bought Hygienic Food Supplies, that's Calorie Control, went into voluntary liquidation this year. So, we decided we'd had enough of this mucking around with Norganic. Delwyn Glen, my fiancee, and I decided that we would expand Aquarian Book Distributors to embrace a new company, Norganic of Australia, take on a big warehouse, and do the proper distribution in the way we know it to be done. No other products, just Norganic and Bernard Jensen products, that's all we have.

How did the books start?

The books started in 1970, when I was over there and I became friendly with Bernard Jensen and Paul Bragg and they said "When can we get our books into Australia?" So I said 'Well, why don't we import a dozen of each and see how they go?" That's how we started.

That built up!

You bet! And we've been representing Bernard Jensen ever since and Paul Bragg, who died in December 1976. We started with Rodale Press early. In fact, Robert's father, J.I. Rodale, died on television on a night I happened to be watching it while I was doing my internship in Florida. He had a heart attack on the Dick Cavett show. Dick Cavett was talking to him, then talking to another guest. J.I. Rodale was sitting back there with his eyes closed. Dick Cavett turned round to talk to him and he didn't answer. He was dead. It was quite a shock. He died, I think it was in July 1971, when he'd just turned 72. His ambition had been to live over three centuries. He was born in 1899 and wanted to live until 2001.

I called at Rodale Press a few times. I met Robert and spent quite an interesting morning with him. In fact, we walked into Robert's office and he was pedalling his exercise bike that was driving a generator that was powering a television set. If he didn't keep up a certain speed, he lost the picture on the screen.

When did you start your retail outlets?

We started in retail. That was in 1968 in the garage at my home, doing home deliveries of organic fruit and vegetables. We moved to West Ryde in 1969, to Ryedale Road, where we had full retail sales, but still did home deliveries. Then we started wholesaling in 1971. In 1975 we moved to Bowden Street, West Ryde, to the warehouse. We then opened up Ryedale Road as a retail shop and then in the ensuing couple of years bought two other retail shops, one at Carlingford and one at Baulkham Hills. They still function as health food stores.

Now it's starting again, because we're looking to open a retail shop next year.

What made you get out of it at the time you did?

I wanted to spend more time on books, lecturing and consulting. I had written *From Soil to Psyche* in 1975 as my first book. It was published in 1977 and the recipe book was published the following year. What I wanted to do was to update that, expand it considerably, and it resulted in *New Dimensions in Health* and the *New Dimensions Recipe Book*. I also wanted to spend more time teaching numerology and philosophy. We wanted more money in the business to expand interstate and we sold in 1979 to a company called Gilbert Lodge. That injected funds into the business and we opened branches in Brisbane and Melbourne and developed an export market.

Then I felt that I wasn't doing the right thing by myself. I'd been 13 years in it and decided by 1981 that I'd had enought and that the cycle had finished.

Then what made you come back into it?

Well in 1983, *New Dimensions in Health* came out. It was the biggest book I've ever written and therefore I wanted to get good distribution for it. We found that other distributors were doing such a poor job that Delwyn and I thought that we should start up a business that would distribute just a range of books into the health food industry. So we arranged with Calorie Control to take over their business of importing and selecting titles and appoint them to distribute to the health food industry. But they proved that they couldn't continue to do that either and eventually we took that over from them and ultimately, of course, they went into liquidation.

Do you still visit America?

Yes, though I don't do so much lecturing over there now, just an occassional lecture. Again, this is because of the time factor – I only have eight days in a week! We go over there for the annual book convention and if I've got a new book out, which I have from time to time, then I'll do a book signing or one or two promotions. As The Pythagorean Press, I've published three books, *The Dorothy Hall Herb Tea Book* , Gradon Rixon's *Pyramid Power and Psychic Healing* and the original *Guidebook to Nutritional Factors in Foods* and then developed an export market by selling those overseas.

What do you think is bad, what's the worst thing you see in our society as you look around?

Ignorance ... ignorance of the right purpose of life.

And how do you think people can overcome that?

Come to a better understanding? Observation. People don't observe what they're doing. They don't observe what others are doing. They go through life in a zigzag manner, being pushed from pillar to post without realising that the straight line is the shortest distance between two points. We all do that. We all zigzag 90 per cent of the time, but the result of this has been so many learning experiences that, maybe, could have been avoided. We could make more progress in our ultimate goal towards perfection.

What can young people do to lead a whole life?

First, they should objectively detach themselves from their parents' brainwashing.

Even in nutrition, we don't *learn* what's right to eat, we only follow the habits of our parents. In thinking, we don't *learn* the right way to develop an attitude towards life, towards ourselves and towards other people. We only follow our parents' prejudices. If our parents tell us "Don't go out with him because he's Catholic" or "Don't go out with her because she's Jewish", then we develop an antithesis towards Catholics or Jews, which in turn creates bigotry. Or " You must eat meat for your protein", so we think that vegetarians are weirdos that are going to die of malnutrition.

So you can get a completely balanced vegetarian diet if you study it and understand it?

Well, you can't on a meat diet. You can't get a completely balanced diet, because meat is so deficient in certain essential nutrients, particularly fibre, and is so excessive in cholesterol. Whereas vegetarian protein sources, such as nuts and seeds are the reverse. They have fibre and no cholesterol.

Vitamin B12 is always a big concern in diets which use no animal products.

Yes, and yet people who are so concerned about it and take vitamin B12 injections or vitamin B12 tablets, recognise that the B12 comes from the livers of vegetarian animals. They get it from eating plenty of sprouts and foods which are abundant in B complex vitamins. The B12 we need is a micro-vitamin, not a milli-vitamin, it comes in micrograms. Its sources are the same as the other B vitamins: whole grains, sprouts, seeds and nuts, in minute quantities.

Can we ask about your routine of life? Do you fast often?

No, I fast whenever my body tells me it's the right time to have a fast day and it's generally only for one day. If I get a cold, which I recall doing about three or four years ago ... I fasted then for the duration that my nose was running, which was three days.

If I go out for dinner, if we're entertaining, or being entertained, which is the habit in business, we'll either choose a vegetarian restaurant, or we'll go where we can get good food. I will eat fish occassionally, if there's no alternative. If the next morning I wake up feeling anything but hungry, feeling as though I've still got that digestive carry-over, the food hangover from the previous night, then I won't eat until I feel like eating. Now that might be dinner that night, it might be breakfast the next morning, or it might be lunch the next day. You can call that a fast. I call it just abstinence from two, three or four meals, but it's a fast day. On the average, it might occur every three or four weeks.

Do you rest when you don't eat?

I really slow down, the day that I'm not eating and the next day. I go very, very slowly. If I come to work, I work very slowly and quietly with the office door closed. Ideally, one should rest. I believe that you gain more by working slowly than not working at all, so I give myself the choice. I've either got to work slowly, or I don't come to work.

What do you think is the best thing you've done, your best achievement?

I haven't got there yet! I suppose pioneering the supply of organic products. The thing in 1968 that gave me great stimulation was the number of people who said that it couldn't be done. There were people who had tried and failed. I knew it could be done, I knew it *had* to be done. It was just a matter of time and a matter of perseverence and I was in the fortunate position of having run a successful business for the nine previous years and being able to sell out and have sufficient cash reserves to last me for a while if it didn't work. But it did work.

Have you got a special goal, something you would like to achieve one day?

It's probably a general, altruistic goal that many people have. I want to see the world a more peaceful, a more understanding, more loving place. And I haven't done enough yet, within myself, to achieve it within my own personality to be able to broadcast it beyond. I'm still working on me. When I get to the point where I think I'm 80-90 per cent there, then I'll go out and lecture on it.

That's why I'm back in business, because I have a lot of working through here to get a better perspective on not only how to make money, but how to use money and how to help others to make money. Because in previous businesses I've manintained, the last one and the one before, I had one or two partners (in the last one, my two brothers) and we shared the total running of it. Now I'm bringing people up into the business to share it. I've learnt how to delegate in a way I wasn't able to before, perhaps because this is becoming a bigger business than anything else I've done. It's interesting just to stand aside and watch myself doing it and know that it's okay to let go. ◊EG

Land lines are for people buying, selling, seeking or sharing land and houses. We charge a flat rate of $12.00 prepaid for a listing of 50 words (maximum), plus full name and address (compulsory) and phone numbers (optional).

Send land lines to Earth Garden, PO Box 188, Moreland, Victoria 3058. Deadline for EG53 is January 7, 1987.

Mt. Oak Community — free land. Settlement under ecological guidelines at Mt. Oak is open to all people who can respect that the land is held in trust and cannot be privately owned. For more information write to Box 6, Cooma, NSW 2630, or ring (0648) 4482 (Bredbo manual exchange) and ask for 67.

For sale: share in 1,000 acre valley, 20 mins from Kyogle, NSW. Partly rainforested with creek, 10 acre entitlement, with 700 acres in common. Accessible site with beautiful views. Price $9,000.

John Gray, 19 Birley Street, Spring Hill, Brisbane, Qld. 4000. Phone (07) 8318581.

land lines

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Ring Peter Coxhead (002) 951374, or write C/- P.O. Cygnet, Tasmania 7112, for more particulars.

For sale at Upper Eden Creek (1/2 hour drive from Kyogle, NSW): about 200 acres, mainly rainforest regrowth, hilly terrain, $41,000. Also: homesite with 15 acres, same locality, $19,000. Both have access to permanent creek.

Apply to Ranier & Eva Taeni, Barkers Vale, via Kyogle, NSW 2474. Phone (066) 897231.

Share for sale in 800 acres property, south of Woodburn, north coast NSW. Abundant wildlife, eucalypt forest, bush and heath, bordering Bundjalung National Park, 20 mins surfing beach, shops, school.

Share includes private use of 10 acres with attractive 4 bedroom homestead with verandah and pergola, large working shed, generator, telephone, greenhouse, above ground swimming pool, various fruit trees. Part ownership of 650 acres, use of community facilities such as tractor and implements. Community is set up with unique legal structure. Price $59,950.

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Land, Murwillumbah area, only a few lots left, approx. 12 acres each in this hamlet development. Majority beautiful rainforest setting. Adjoins State Forest, privacy assured. Only those at peace with the environment will be selected to share in its enjoyment. Priced from $16,000.

Further details phone J. Andersson (062) 512247, AH (066) 793333, or write to 30 Arndell Street, Macquarie A.C.T. 2614.

Moora Moora Co-operative, near Healesville, will shortly have an opportunity for a person or family to become a part of Moora Moora without the expense of long term commitment of membership. The position of caretaker will become vacant soon. The caretaker needs to live in the Community Centre (in a self contained flat). Most members live in their own homes, so we are looking for someone: a single parent with one or two children, a young couple with at most one child, an active retired couple, or perhaps a single person looking for somewhere to belong. The caretaker needs to be honest, friendly, with a liking for people, organisational ability and skill in making a place feel welcoming.

If you are interested, please write for further details to the Membership Committee, Moora Moora Co-operative, P.0. Box 214, Healesville, Victoria 3777.

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ENERGY PULSE . . . ENERGY

THE SOLAR RACE

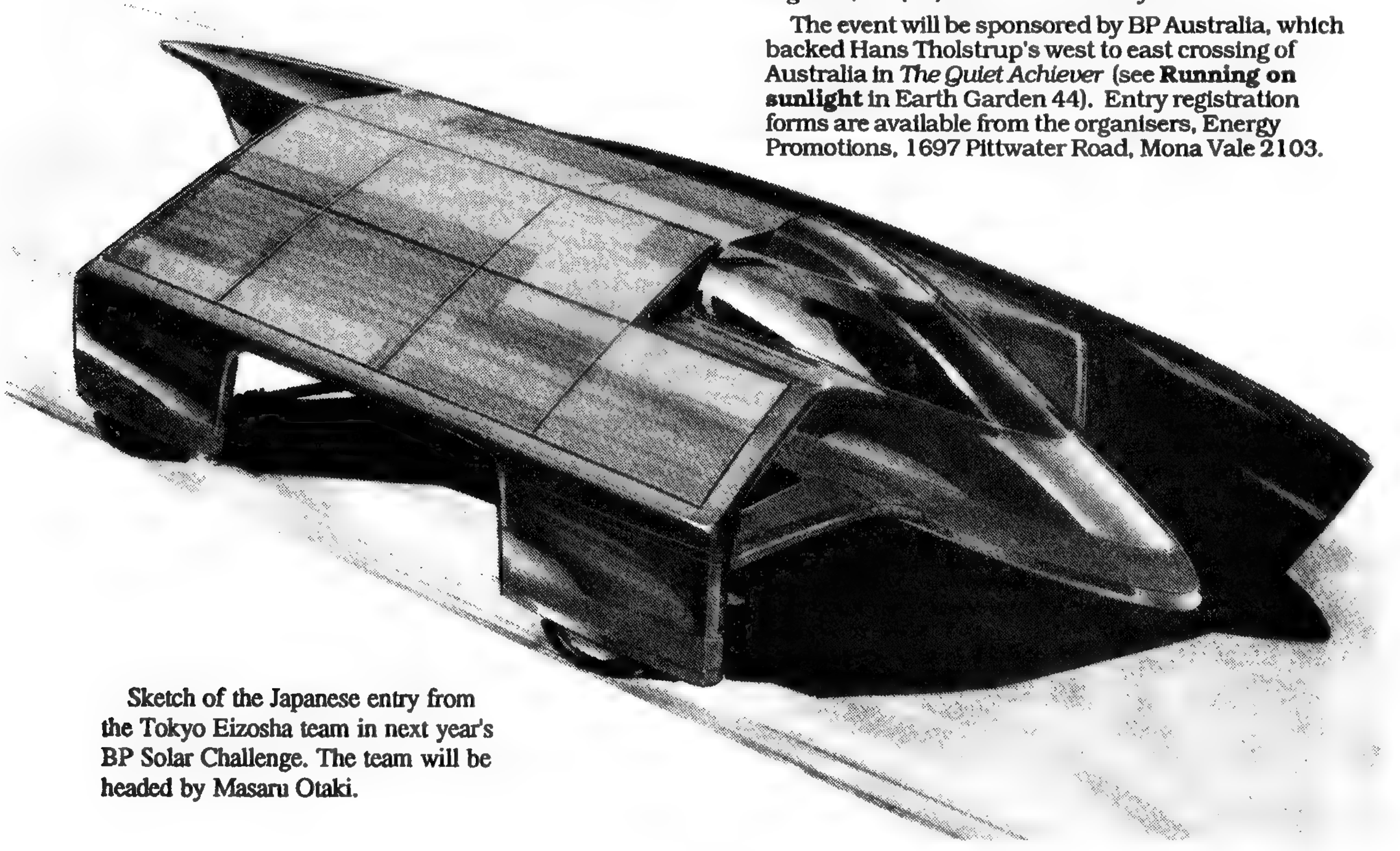
More than 15 solar electric vehicles powered by the rays of the sun will race each other over a 3,200 km route along the newly surfaced Stuart Highway from Darwin to Adelaide in the *BP Solar Challenge* in November 1987. The race is expected to take 10 days.

Vehicles entered may have three or four wheels, but must not be larger than 6 metres long, 2 metres wide and 2 metres high. They must be powered by photovoltaic panels which may be mounted on any part of the vehicle, but must not exceed 8 square metres.

A firm entry is the vehicle shown in the illustration, desiged by Norio Eguchi and constructed by Tokyo Eizosha for the Eizo Solar Japan team, headed by Masaru Otaki. "The efficient use of sunlight hours is achieved by the utilisation of a 3 dimensional roof structure", says Mr. Otaki. "Constant, regular power output is being sought by us rather than temporary, high level power output."

Australian entries so far have been received from Ford Australia, 2 Base Battalion Workshop RAEME, Sydney University, Warragul Technical School, Chisholm Institute of Technology, Morphett Vale High School (SA) and the University of NSW.

The event will be sponsored by BP Australia, which backed Hans Tholstrup's west to east crossing of Australia in *The Quiet Achiever* (see **Running on sunlight** in Earth Garden 44). Entry registration forms are available from the organisers, Energy Promotions, 1697 Pittwater Road, Mona Vale 2103.



Sketch of the Japanese entry from the Tokyo Eizosha team in next year's BP Solar Challenge. The team will be headed by Masaru Otaki.

PULSE . . . ENERGY PULSE . . .

By Keith Smith

REMOTE POWER SUBSIDY FOR NSW

Grants and subsidies will soon be available to help people living in remote areas of New South Wales to set up their own power systems or to defray the high cost of connection to the grid. A scheme to be administered by the Energy Authority of NSW goes into effect from January 1, 1987.

Such a scheme should foster the use of renewable sources of energy such as solar electric, wind generators and micro hydro systems (where they are suitable for the site) and encourage the industries which supply and service them. Full details of how the scheme will work have not been officially announced as we went to press, but further information is available from your local county council.

The scheme acknowledges that people in remote areas must pay a high cost to:

- obtain a reasonable electricity supply;
- be connected to a council supply; or
- set up their own small power system.

Remote householders will be able to choose between connection to the grid or a power system, but where grid connection is available it will be encouraged. They should be eligible for a grant if the cost of connection is more than $20,000. I understand that this is an average cost, so if 10 people pay $10,000 to connect in a group, they would not be eligible for a grant.

The subsidy for grid connection is expected to range from40 per cent to a maximum payout of $10,000. If the cost is $35,000 you would get $10,000.

The subsidy for a remote power system should range from40 per cent to a maximum of $25,000 capital expenditure (for which you would get $10,000). A solar hot water system will be eligible for a grant.

The maximum subsidy for a diesel or petrol generator set is $3,000, though I believe you could claim for two small generators. To obtain the full $3,000, you would need to spend $7,500.

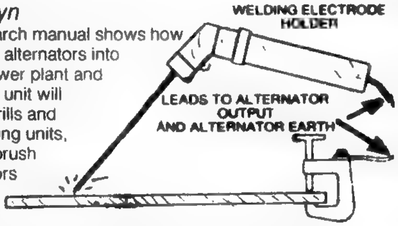
People must set up and maintain their own systems, but there is an additional subsidy for upkeep and maintenance of $250 per annum, up to 50 per cent in a year, to cover the cost of new batteries, inverters and repairs.

Of course, there will be ground rules to make administration of the grants easier. A minimum expenditure will be $2,000 and you will only be able apply for two grants in a period of five years. Subsidies will be available only to permanent residents who own their own property — which rules out 'hobby farmers' or people who do not live on a property.

Only one grant per property will be allowed and only one grant per applicant — which rules out property managers and people renting or leasing (and also, most likely, people in multiple occupancy hamlets).

HOW TO BUILD A PORTABLE HIGH VOLTAGE POWER PLANT AND WELDING UNIT USING A SECONDHAND CAR OR TRUCK ALTERNATOR

Research and Design
by Jim Allowyn



This special research manual shows how to convert old car alternators into a high voltage power plant and welding unit. This unit will run 240v lights, drills and power tools, heating units, and all universal brush type electric motors (will not operate induction motors) You will also be able to fast charge batteries, arc weld, fusion weld with carbon arc rods, solder (low heat or hot), braze, cut steel and heat steel to near melting point for shaping and bending. Old 35amp Bosch and Lucas alternators work very well. The modifications are easily done by anyone with ordinary tools All the required parts are available from auto-electricians or auto accessory shops, and that total cost of parts is less than $10.00

As a guideline to performance, one 35amp alternator will run 240v lights, power tools, spot weld, heat steel with twin carbon arc rods and do light welding. Two 35amp alternators wired in parallel gives an output of 70 amps which is plenty for most jobs.

NOTE: The amps/voltage ratio is easily varied and controlled enabling a low voltage, high amperage current, or a stabilized amp base with full variable low to high voltages.

In addition to using your existing car alternator and pulley you will learn about various drive line options including a high speed ground level wind chute power turbine which you can build yourself, and a water wheel with enough power and torque to twist and break a 25mm solid steel drive shaft. Included is a simple method to convert old car generators into 2 speed 12v electric motors, and a special section on formulas and chemicals which you can use and make yourself to rejuvenate old batteries. P37 **$11.95**

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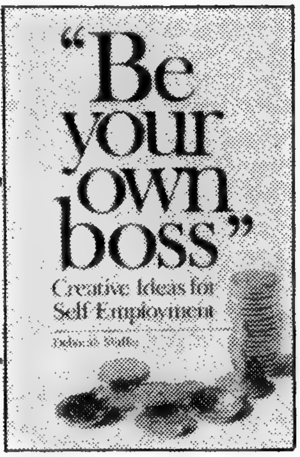

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EFFICIENT COMPOST

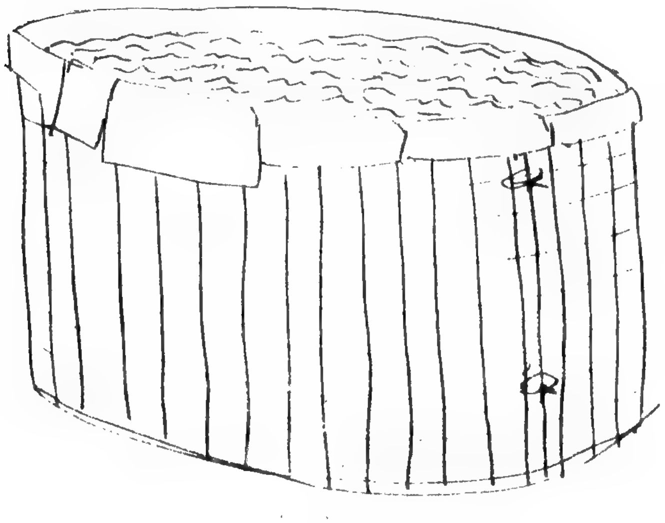
By David King

To measure maximum efficiency we should take into account capital costs, labour and quality of product. My solution — using a circular mesh bin — doesn't produce the best compost, but it's cheap to erect and requires less labour than most other methods.

When I had a three box system, I always felt guilty when all the boxes weren't full. The slats which are removed from the front of the boxes often stuck and the whole unit requires eight posts and over 100 metres of boards.

Where I now live my first compost system was a two box setup with six posts and green sleeper offcuts for walls. There was less guilt about filling, but I still had stuck slats in the removable wall.

After several years some of the offcuts were springing off the nails and white ants were chomping at the posts. It was time for the maximum efficiency compost heap.



Much of the nutrient from a compost heap ends up in the ground underneath, so one idea was to have a heap which could be moved around to enrich different parts of our site.

To construct the heap, a length of mesh is bent into a circle held together by two ties of wire. It should be about 1.2 m high and 1.6 m in diameter, so the length should be approximately 4.7 m. If the ground is not level, take steps to ensure that the sides are vertical, either by digging out the top side, or slipping boards or bricks under the low side. One person can carry this rolled shape fairly easily.

The inside of the wire mesh should be covered with several layers of overlapped cardboard. This can be obtained from large appliance cartons, lawn mower shipping cartons, etc. Sometimes a dozen eggs can produce plenty of material from a friendly storeman.

The heap should be filled quickly. Climb on it occassionally, particularly to pack the sides in and thus keep the lining in place. I find a good heap needs 5%-8% topsoil in the mix. Don't shake the soil from weeds destined for the heap. I use some sawdust and add manure to ensure there is no nitrogen deficiency in the heap.

Within one week the heap will have sunk by oine-third, but it can be topped up with more materials. Each month, for the life of the heap, climb on top (you can lay a board across to avoid packing) and drive a crowbar through the heap to the soil level in 15-20 places. This takes 10 minutes and is a much easier method of aerating your compost to provide oxygen for the bacteria than the tedious recommended method of turning the heap. If the bar doesn't come out greasily moist add a sprinkling of water, say five buckets.

I make two compost heaps per year, over five months in summer and six months in winter. It takes about three days to use a heap and eight days to fill it again each time (allow two weeks). As well as weeds, vines, sawdust and manure, kitchen scraps and small amounts of paper, we always add some comfrey and any other herbs available, such as mint and yarrow.

When dismantling the heap, the top 300 mm which, though not broken down, has served the function of insulating the lower compost, should be placed aside in bins and large pots to be incorporated into the next heap. The cardboard from the sides is used as tree mulch and fresh recycled material is used to line the mesh at the next heap site.

Where the compost heap stood, a circle of 1.5 m in diameter, rich in worms and humus, is ready to be planted. So for those who haven't had time for compost making — no more excuses!

David King wrote on establishing a food forest and garden in **Happy gardening** (Earth Garden 50). See our **Organic growing guide** (EG30) for all kinds of bins, boxes, drums, trenches and pits for making compost.

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BLUE MOUNTAINS

Intensive composting with earthworms

BY Allan Mitchell

As someone who has worn out the joke of "I've got worms" and exhausted the phrase "hundreds of thousands of head of stock out back", I have come to regard raising earthworms as a practical and rewarding activity.

People become involved with worms for a variety of reasons, some for fishing bair, some for private garbage disposal, some for improving their gardens; others may have a more extensive programme of breeding and application in mind, such as pasture improvement, sewage reduction, municipal garbage disposal and whatever else comes to the mind of someone who thinks beyond the local garbage service or incinerator.

Earthworms are those self-starting, self-propagating, tireless little humus factories. They labour long hours in the dark and are happy to live in muck and eat garbage.

They don't really require too great an effort to raise and they do return something of value to those that take the time to find out 'what not to do'.

To start, you need the worms, bedding, suitable feed, a water supply and an appropriate location.

WORMS... out of thousands of types, two are the most useful in intensive composting. Both are manure worms, both are accidental imports from Europe, both are found readily in Australia (where local conditions are suitable) and both are commercially available either separately, or as a mixture.

They are the Red worm (*Lumbricus rubellus*) and Tiger Worm (*Eisenia foetida*).

These two varieties are most useful in that they will consume a great variety of feed types, the Red worm being the less fussy. They will feed on the surface and deposit their casts at depth, in nature, but will feed at depth if sufficient aeration is provided. They are also capable of breeding at relatively high rates compared to other species and they will tolerate a greater degree of crowding. Red worms may double their numbers in two months under 'ideal' conditions, so that 1,000 worms might produce 64,000 in one year.

BEDDING ... a mixture of organic and mineral matter in which the worms may find a haven to which they may retreat from adverse conditions, from which they may feed, and in which they may deposit their castings and egg capsules, gradually transforming the original material from a crumbly, fibrous mixture into a homogenous, fertile mass of moist humus, teeming with macro and microscopic life and with a high available and reserve plant nutrient supply.

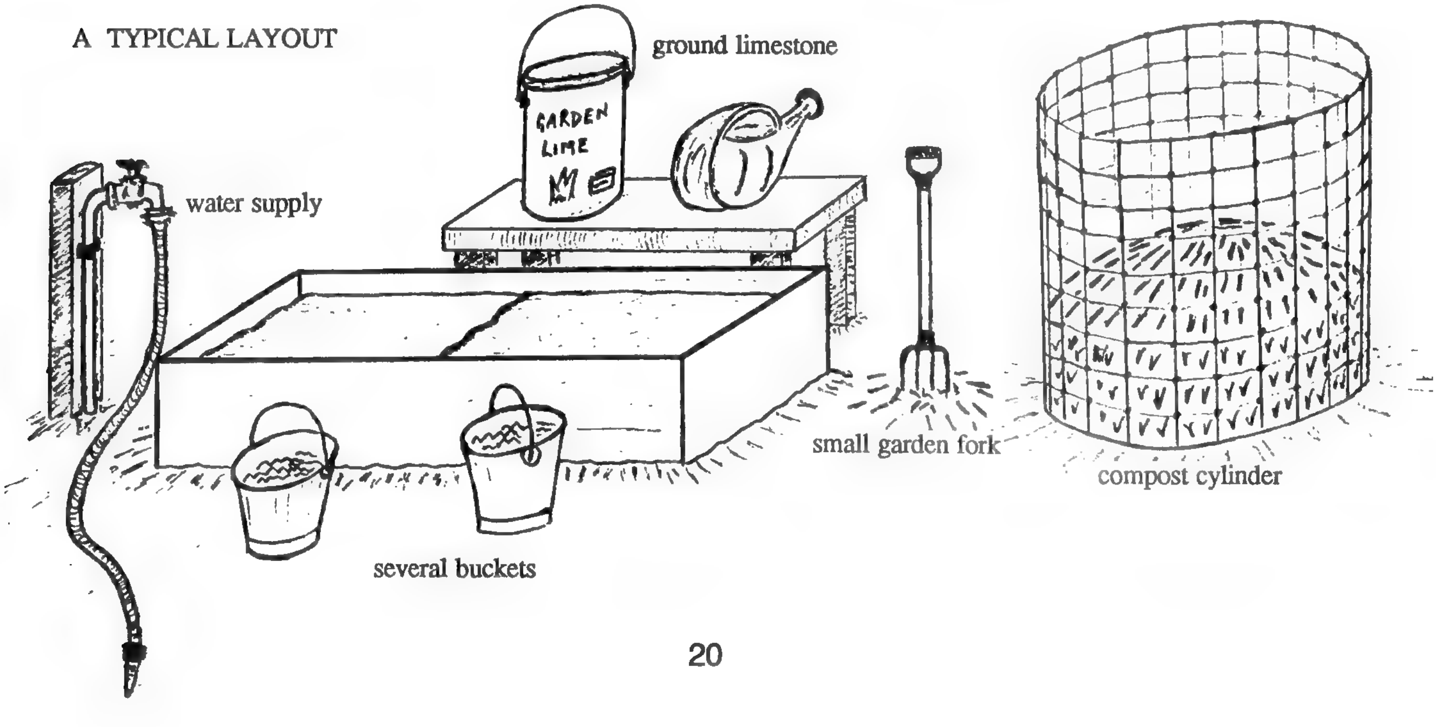
Bedding can be almost any composted cellulosic waste (old grass clippings, horse and cow manure, shredded newspapers and cardboard) soaked and drained to dampness, used as is and sprinkled with mineral soil, or mixed with a mineral soil (e.g. a loamy type).

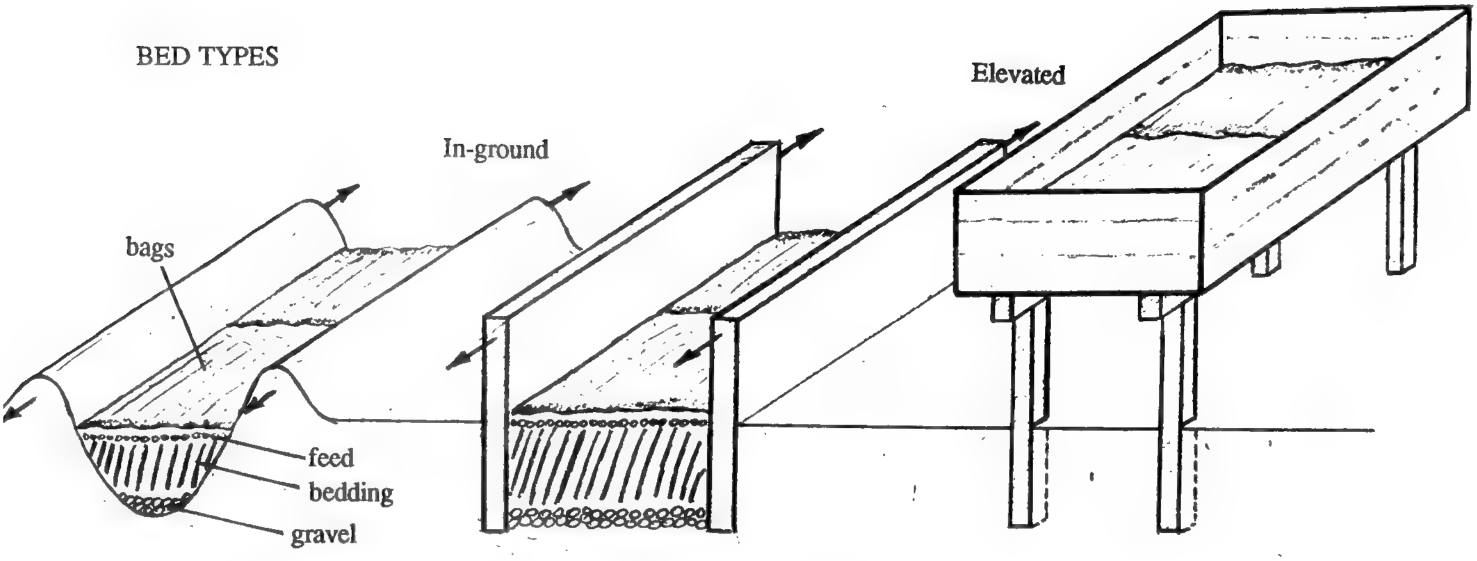
FEED... highly variable, depending upon your reason for raising worms.

Fresh manure is suitable if it is first soaked and drained, then applied in small quantities. Old manure similarly treated is also suitable but may have lost some of its nutrient value.

Grass clippings, leaves, etc. should not be applied fresh but should be composted from several weeks to months

A TYPICAL LAYOUT





until no excessive heat remains. Small quantities of fresh material may be tolerated.

Household scraps are quite variable. Meat should be placed in the bedding to avoid odours, citrus peel and aromatic wastes (such as onions), should be composted first and bread should be broken up and spread. Potato peels should also be broken up (if they sprout they can be pulled up and left on top of the bedding as is the case with oats, etc. from horse manure). Most scraps can be spread across the bed and lightly covered with old grass, then covered with a damp sack.

Ground limestone should be sprinkled over the bed from time to time to reduce excessive acidity (especially from household wastes) and because the worms have a metabolic calcium requirement (they excrete the calcium finally as amorphous calcium carbonate, itself a fertilising factor).

A composting cylinder can be constructed from coarse plastic or wire mesh, 1 m high x 1 metre diameter is convenient. It will hold about 800 litres (about four 44 gallon drums) when full. This is used as feed or to make further bedding.

WATER ... worm beds should be soaked, they should be damp and aerated. Tiger worms will tolerate wetter conditions than Red worms. Light hosing is alright, but try not to wet the surrounding area or hose too close to evening, as this may cause your brood to wander. Covering the beds with damp (soaked and drained) hessian bags will serve to conserve moisture and help keep out pests, particularly flies.

Using town water or tank (rainwater) does not seem to be a concern, but try to avoid new pipes, taps and galvanised iron until you have tested for any adverse effects on a sample of your worms (say 20 or so) for several days. Worms can concentrate many 'pollutants' in their body tissues with little or no effect on themselves.

LOCATION... out of the sun, out of the rain, out of the wind.

Too much sun will heat and dry the bed causing the worms to leave by burrowing, or to die.

Too much rain will swamp the bed annd leave them anaerobic and smelly; the worms will have been long gone, or drowned.

Too much wind will blow the covers off beds, remove bedding and feed and dry out the beds. Wind appears to have some effect as a migratory signal, in which case your worms may leave in all directions.

STOCKING ... a worm bed can be a ditch in the ground, a bottomless box, an elevated box or any drainable container of sufficient size such as an old bath, a set of tubs, a large garbage bin, etc.

The bed which you choose should be of a practical size.

Width ... 60 to 90 cm (2-3 ft) allows ease of working from either side without a lot of stretching. This width range allows for standard widths of corrugated iron if in an exposed site.

Length ... 120 to 240 cm (4-8 ft) is common for on-ground or in-ground beds, 120 cm (4 ft) is practical for an elevated bed.

Depth ... about 30 cm (1 ft) . Start with bedding to about 15 cm and the bed will gradually fill up with castings and worms.

MATERIALS ... beds can be made from earth, bricks, concrete blocks, hardwood planks, fence palings, or whatever is handy.

Other materials (where required).

- Gravel for drainage (in, or on-ground beds)
- Pie dishes for ant-capping (elevated beds)
- Hessian bags, secondhand.
- Wooden posts and rails, 50 x 50 cm minimum (elevated beds)
- Corrugated iron sheeting , secondhand.

Once all is prepared in construction and bedding, add your worms in the morning at the rate of about 1,000-5,000 worms per square metre of surface. This rate is not critical but will depend upon your ability to obtain stock. Generally you should expect to pay $10 or so per 1,000 Red or Tiger worms, depending on the number you buy.

It may take some months for the worms to grow to maximum size and reach full reproductive potential, so you will have to buy lots of stock, be patient, or dig your own.

Feeding can be every day or few days, but uneaten food should not build up on the beds.

Keeping beds moist and limed should keep most insect pests from establishing themselves. Slaters and earwigs are no menace and can be useful, but ant nests are a nusiance and if persistent can be dug out and dropped in water overnight. Return this material to your compost heap after extracting any worms.

Once your bed is established, your household waste may be disposed of in your own processing plant and you will produce rich humus and productive worms instead of feeding starlings and breeding blowflies at your local tip.

Further information may be obtained by writing to Allan Mitchell, 179 Jessie Street, Armidale, NSW 2350.

NEWS FROM NASAA

The National Association for Sustainable Agriculture (see **NASA takes off** by Sandy Fritz in Earth Garden 50) has added an A for Australia to its title. The Association also has a new address: Box A 366, Sydney South, NSW 2000.

NASA is currently investigating the possibility that the IFOAM (International Federation of Organic Agriculture Movements) Conference will be held in in Australia in 1988.

FREE FERTILISERS

By Jacqueline French

Adding fertility to your soil is easy. Just go down to the garden centre, buy a bag of stuff, and dump it on the garden.

That's if you don't mind paying the price — the cost of the fertiliser, the cost to your soil and the added pest and health problems you may get if the bag (as it probably does) contains too much nitrogen. The nitrogen is to give your crops a big green boost, so they look fantastic (for a while) and you will feel that you've got your money's worth.

For the organic grower there are four ways of adding fertility to your soil:

1. **Adding organic nutrients,** like manure, blood and bone.
2. **Recycling nutrients**; making compost and mulches from your wastes.
3. **Making those nutrients 'locked' in the soil more available**, for example, by encouraging earthworms, bacteria and fungi that will break down material in the soil into a form that the plants can use (and artificial fertilisers won't help these processes at all). Adding deep rooted plants like comfrey or lucerne will 'root out' deeply leached nutrients, so that they can be harvested with the green leafy material at the surface for mulch or compost where they are needed, at the surface.
4. **Increasing the microflora of the soil,** for example, *rhizobium* bacteria, which fix nitrogen in association with legumes and other roots and other microflora like *clostridium pasteurianum* and *azobacter* that 'fix' nitrogen from the air on their own

Nitrogen is one of the major elements needed for plant growth. If you harvest a hectare of wheat, for example, you'll also harvest about 22 kg of nitrogen with it. But a 1 ha green manure crop of lupins can fix about 160 kg of nitrogen per year, lucerne anywhere from 100-600 kg, peas about 80 kg, azolla (a plant algal association) up to 300 kg and blue green algae about 25 kg.

There are two ways of fixing nitrogen with plants. The first is to grow plants which also have nitrogen fixing associations, for example, peas, beans and broad beans for human use, or lucerne and cowpeas for animal use. After harvesting, the remaining plants are dug in for green manure, or left on top of the soil as mulch. However, much of the nutrient value is lost with the harvest, unless your animals are grazing on the site, so that their manure enriches the soil to replace the crop loss.

The second method is to dig in the crop, or cut it for mulch, just before flowering when it is richest in nutrients. You'll lose a crop, but gain a fertiliser.

Green manures have other virtues too. They will protect bare soil from erosion if there is a gap between one crop and another. They also help with weed control. A good, choking buckwheat crop, say, will outgrow most weeds around. Plough it in after about six weeks growth before the weeds have time to set seed.

Green manure improves the texture of the soil by adding humus and can also help in disease control. An oat or barley crop, for instance, helps control root knot eelworm. Disease organisms can start to multiply on a green manure crop and then die off as the crop is dug in and rots, leaving them without a host.

Not all green manures are nitrogen fixing. Buckwheat and mustard aren't for example. But most are worth trying, if you can spare six weeks or so in the rotation of your garden.

Plant algal associations also fix nitrogen. *Gunnera, azollas* and even lichens can fix 40 kg - 50 kg of nitrogen per ha per year. *Azollas* in particular are used as a major source of fertiliser for rice crops in many parts of Asia, thgough obtaining a source of *azolla* in Australia is difficult.

Free living microorganisms. Blue green algae, *azobacter, clostridium pasteurianum* and other free living organisms also fix nitrogen by themselves, not in association with anything else. The blue green gunge you find in creeks or in your fish pond could be valuable fertiliser for your garden. The exact value can vary enormously with the strain, but whatever sort, it's worth harvesting and bunging on the vegies.

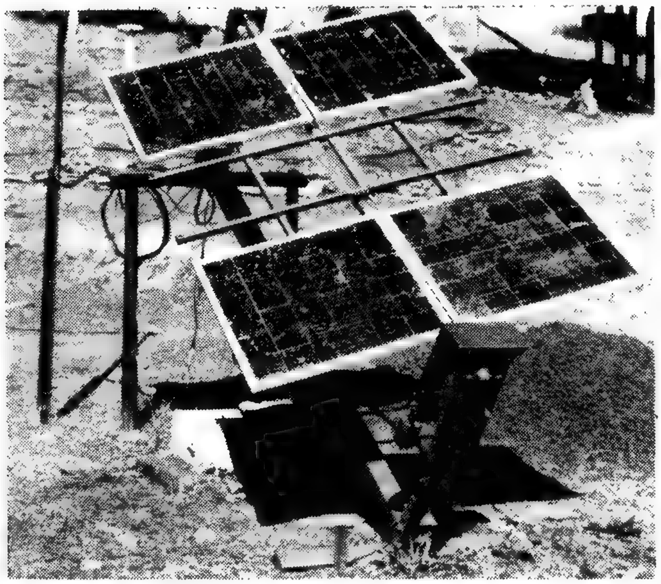
For the backyard gardener there are other ways of getting free fertiliser. Some ornamental nitrogen fixing plants include honey locust, Judas tree, yellow wood, woad (a rather nice annual used for blue dye), broom (try the sterile varieties that won't go noxious on you), black locust, mesquite and sweet peas.

Or try grazing some animals in your garden, even a hutch of guinea pigs or rabbits. Fertility from animals shouldn't just be measured by the amount of nutrients in their manure. Fresh animal products stimulate the microlife in the soil. You'll find the response in your plants much greater than the amount of nutrient delivered would warrant.

The microlife in your soil is the least visible way of adding fertility, but it can be effective nonetheless.

Jacqueline French is the author of **Organic Gardening for Australians** (Reed) and wrote about starting a vegetable garden in **Vegie basics** in Earth Garden 51.

BUYER BEWARE!



Kirby solar tracker with four Solarex panels. Two more panels will be added when finances permit.

WHEN TRACKERS AIN'T TRACKING

By Chris Martin

In **Energy off the shelf** in Earth Garden 44, we commented that there was probably a good market for a reasonably priced solar tracker.

The only solar tracker we knew about was very expensive at $1500-$2000 as it was designed for a large number of photovoltaic panels. So we were pleased to find (in EG46) that Kirby Solar in Victoria were manufacturing a range of trackers to operate 4-12 panels at reasonable prices. The article also suggested that there would be almost a doubling of power output. We sent off for a brochure and price list and eventually ordered a 6 panel tracker from our regular suppliers, Self Sufficiency Supplies of Kempsey, NSW, in June 1985.

After some problems with panel sizes and voltages, the unit was eventually delivered in September, but broke down only two weeks after installation. Apparently ours was the first 24 V unit produced, as all others had been 12 V.

The tracker worked off four light sensing devices, one — the 'east seeker' — was to turn the tracker towards the east when the sun came over the horizon, while the other three tracked the sun from east to west during the day. The unit swivelled on a base parallel to the ground and was run by a windscreen wiper motor.

The repairs kept the tracker going for a month. The electronics went back to the manufacturer again after we woke one morning to find the thing facing south instead of east! It came back in December during the summer solstice when the sun's azimuth was at its highest elevation.

Some new electronics had been installed which allowed the sensitivity of the sensors to be altered in the field. However, we then found that the tracker would not turn any further than the north-east after its initial eastern journey each morning. Altering the sensors did not seem to make any difference and the problem was eventually tracked down to what we believe was a basic design flaw. As the tracker revolved on a base parallel to the ground this left the sensors in a more or less north/south direction. The sun was travelling east to west at its maximum elevation and therefore no light was falling on the west sensor. This unit could be manually over-ridden, but we felt that as we had paid $750 for an *automatic* tracker, this manual interference was defeating the aim.

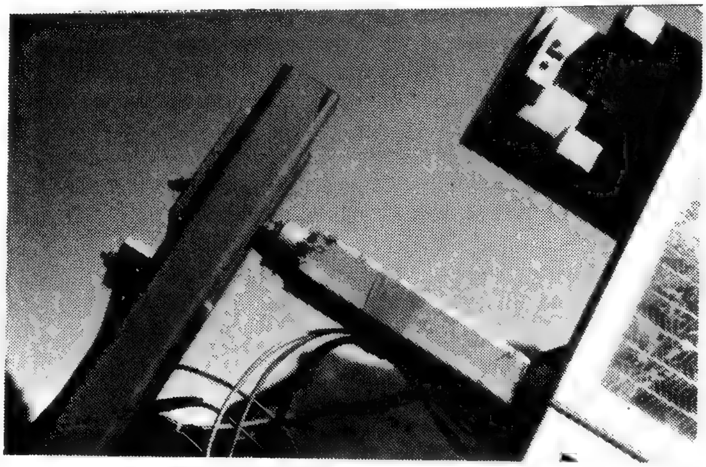
You've guessed it ... back it went , this time the complete unit, in early January 1986. Subsequent telephone conversations revealed that a new design was being manufactured in which the unit tracked equatorally with the sun. That is, the panels tracked with the sun in an arc from east to west, rather than parallel to the ground.

After several phone calls from the end of January, the new tracker was finally on its way in early March, but had to come via good rail freight rather than passenger rail due to its size. What next? A rail strike in Victoria. When the new solar tracker finally arrived on April 24, the railway gremlins had really done a good job on it. Admittedly, this unit is 8 ft long, but we felt it could have been more effectively packaged.

It took about six hours to replace the missing bolts, chain, broken wiring and bent steel. The new tracker was finally commissioned at the end of April and, with a few minor adjustments, has thankfully worked since then without problems.

Our phone bill doubled during this problem period. With repairs and freight costs incurred in having to pay cartage *both* ways, plus extra petrol to run the generator, we conservatively estimate that we are out of pocket by about $300. During the last phone conversation, we were even criticised for calling after hours. We hate to think what our phone bill would have been if all the calls were made during office hours.

A polite request to Mr. Ron Kirby for a refund of at least freight costs and materials used to repair the new tracker was met with a blunt refusal. Mr. Kirby considered that he had "lost enough having to re-make the old unit." He



Close up of the sensor system shows the east seeker (mid left) and tracking sensors (upper right).

suggested that we seek a refund from our suppliers who had done all the ground work. Surely it is the manufacturer's responsibility to market a working product? Our supplier would have lost any profit on the extra phone calls he also had to make trying to get satisfaction on our behalf.

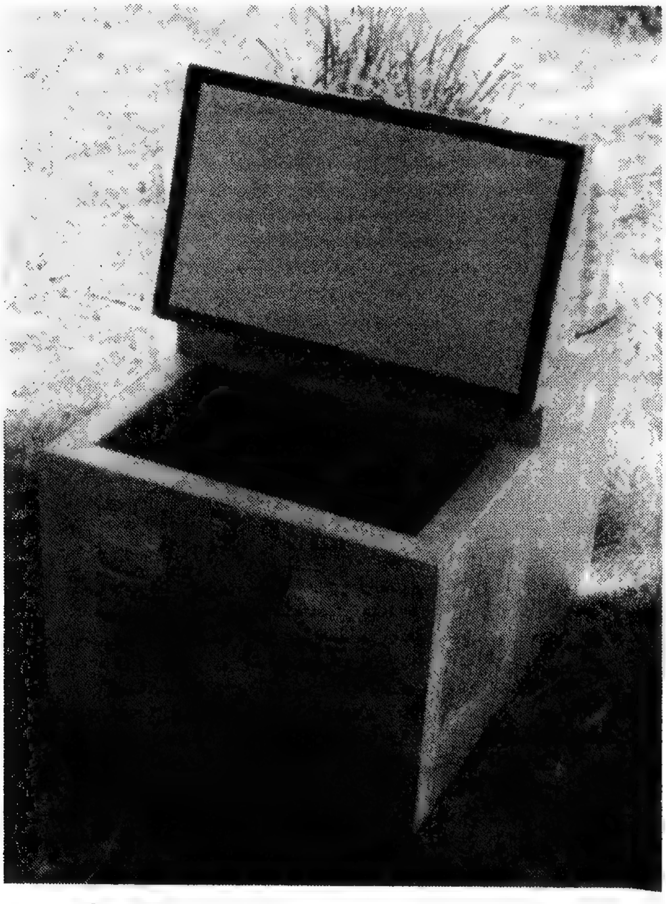
After a while you get tired of being on the 'leading edge of technology'. Let the buyer beware!

The new solar tracker still has a few idiosyncracses, while site location (as with a wind generator) is critical to its effective operation. Any shade falling on the sensors affects the tracker's operation and this is particularly important in the early morning and late afternoon when the low sun angle throws long shadows. Even the shadow from a steel fence post will interfere with the tracking devices.

The new unit is more suitable for roof mounting, providing solid supports and roof structure are available as the azimuth angle must be set manually. The claim of double output is applicable to midsummer only. Due to weaker light intensity an increase of 1.5 times is more reasonable for winter.

On days of full cloud cover the unit should be manually set to face north to make the best use of the diffused light situation as the sensors are activated by full sunlight only. In our situation the horizons are uneven, with the western horizon being closer and darker due to surrounding mountains. As most of our weather movement comes from this direction, there are occassions when the tracker has been fooled and will turn east towards the lighter sky.

Nothing is ever perfect, but it seems the tracker is now working satisfactorily even though it has cost us nearly 50% more than the original price we paid.



Greg Baker's 3.75 cubic ft. AJM freezer unit.

SOLAR ELECTRIC FRIDGES

By Greg Baker

The kerosene refrigerator era (see **Kero refrigeration** in Earth Garden 51) finished at our place with the arrival of our electric, chest style low voltage DC unit and the extra photovoltaic cells and batteries to power it.

The change was the result of growing dissatisfaction with kerosene and some market research. Quite a few manufacturers offer low voltage electric refrigerators, but the one that attracted us, because of its size, was from IPS. Their advertisement showed a solar electric refrigerator under their own banner. When I rang for more details, I discovered that the refrigerators were made in Bendigo, Victoria. Reading between the lines and a few minutes with the Bendigo telephone book turned up the manufacturer — AJM Refrigeration of Holmes Road, Bendigo.

A couple of telephone calls and a subsequent letter from AJM led to the original of the IPS ad, an AJM handout to which IPS had added its own banner. The price from AJM was dramatically lower. So, using our philosophy that it is usually better to deal with the maker than an agent, we sent AJM a cheque for $700 for the refrigerator. In due course it arrived by rail, nicely packed in a cardboard box and a wooden pallet and crate.

To my eyes the unit wasn't a great looker. 'Functional' would be a better word for this great rivetted galvanised steel box with its four sturdy carrying handles. Capacity was 6 cubic feet (170 litres) including the small (14 litre) freezer compartment. The shape was excellent though, with internal dimensions about 60 cm x 70 cm x 40 cm and an opening of 35 cm x 60 cm in the top. 170 litres is the maximum that the *Danfoss* refrigeration unit (the heart of most low voltage refrigerators) can handle.

Well, we wired it in and got it going. It used more power than it should have done (IPS say 2-3 panels are enough), but it cooled everything alright. As a radio freak I was disappointed, mind you, that the radio interference supression of the *Danfoss* electronics wasn't what I'd hoped for. It's annoying to have to switch off the refrigerator to get clear radio reception, especially at night.

Anyway, we were impressed enough with that unit to send another $610 for AJM's freezer. At 3.75 cubic feet (105 litres), it is identical in appearance to the refrigerator, but smaller. Its radio supression seemed to be worse and the interaction between it and the refrigerator when they were both going made radio listening not just unpleasant, but well nigh impossible.

The *Danfoss* instructions (none came from AJM) say not to connect anything between the unit and the power source. It's right too. When I tried to insert a radio frequency choke (an interference supression device) in the line to the battery it refused to operate at all. On another occassion we decided to move the freezer to the laundry 50 metres away and it refused to work there also. The voltage at the freezer was within specifications but I suspect there was too much capacitance between the lines and that upset the electronics.

Anyway, while the refrigerator used a bit more power than we expected, the freezer was running virtually flat out all the time ... and that was fairly quickly the state of our battery bank as well. The system plus the fridge and freezer worked, just, in sunny weather. But in overcast weather the freezer had to go off and that meant an eating spree, a big fry-up, or else fat chooks.

We'd had to buy an extra nine *Tideland* photovoltaic panels — three each for the fridge and the freezer, plus three for the stereo, vacuum cleaner, etc. — making 12 panels in all. This seemed a bit unreasonable to us, especially as we only use lights, radio and fridge and freezer and go without other appliances.

The insulation on these two units is only 5 cm, which compares poorly with many others at up to 12. 5 cm, so we decided to buy a 7.5 cm sheet of polyurethane and some galvanised steel sheet. I manufactured an outer case to fit around the freezer and proceeded to pop rivet it and the insulation to the freezer.

It was then that I made two fascinating discoveries.

The first was the result of drilling holes in the freezer so that I could pop rivet the outer casing to it. The swarf coming out of the hole was not polyurethane, it was polystyrene. Now, not only did the AJM advertisement promise polyurethane, but polystyrene also has poorer insulating properties. *Danfoss* recommends a minimum of 5 cm of polyurethane and 10 cm of polystyrene.

That seemed to explain the problem. Or did it? I worked away and decided not to waste the handles by burying them inside the new outer cabinet, so I removed them. It was then that I made the second fascinating discovery — there was one 5 cm x 50 cm x 55 cm sheet of insulatioin totally missing! Air is, of course, a poorer insulator than polystyrene. That was the main problem. The freezer unit was busy pumping warmth through the two sheet metal walls and trying to cool the room it was in!

I downed tools and rang AJM. The owner was horrifiedat what one of his workers (it turned out to be an ex-worker) had done and promised us a refund of the $610. We didn't suggest a replacement, being a bit wary that we'd get new problems. By the time we were ready to put the re-crated freezer on the train the promised cheque hadn't turned up. Being untrusting by nature, we rang AJM again and found that their solicitors had advised seeing the freezer before sending the money, and that what we would get would depend on the condition of the freezer.

This didn't particularly excite us. With foreign exchange rate changes to the Australian dollar, the $610 wouldn't even buy a *Danfoss* unit anymore, let alone a cabinet to put it in. So we decided to keep the freezer and re-insulate to stay ahead financially. Solicitors cost money and the Victorian Department of Consumer Affairs telephone is either always off the hook or really busy during business hours.

The lesson I suppose is not to believe anything anyone tells you, or anything written either. Check it for yourself. And we did too, out of curiosity, on the refrigerator. I drilled a hole in the side and discovered white, polystyrene swarf, not polyurethane. So the fridge will need some extra insulation, too, but I'll probably postpone it until nearer winter 1987, when I might be able to face it with a dulled memory.

Apart from recommending care when choosing a manufacturer for your cabinet, we thoroughly recommend the *Danfoss* unit as not only economical, but also quiet in operation (except on the radio). All up, your solar electric refrigeration may cost more than other units, but in the long run they've got to be a good buy.

A COOL IDEA

By David MacMunn

For 4 1/2 years we had our small (3 cubic ft.) LP gas refrigerator at ground level, which meant calisthenics and general annoyance every time we opened or closed it.

Eventually, we came up with a design to satisfy a number of requirements. First, we didn't want the refrigerator to take up room in the kitchen; secondly, we wanted the unit to operate as efficiently as possible; and thirdly, we imagined incorporating an area for storing vegetables, etc. under our fridge at working height.

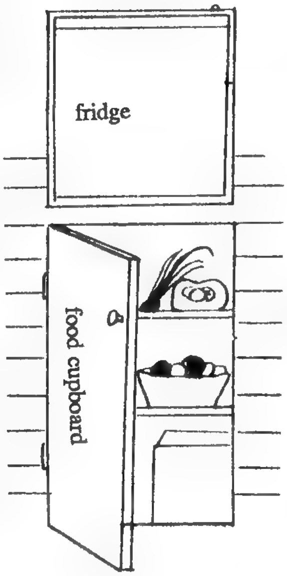
What we ended up with was a cupboard area built outside the kitchen on our eastern wall.

This cupboard incorporates two sections. A top section houses the fridge so that only the door is visible from inside the kitchen. At the back of this space a small door provides entry to the rear of the refrigerator. A wired off section above and in the door and top of the cupboard allows for good ventilation to assist effective heat dissipation.

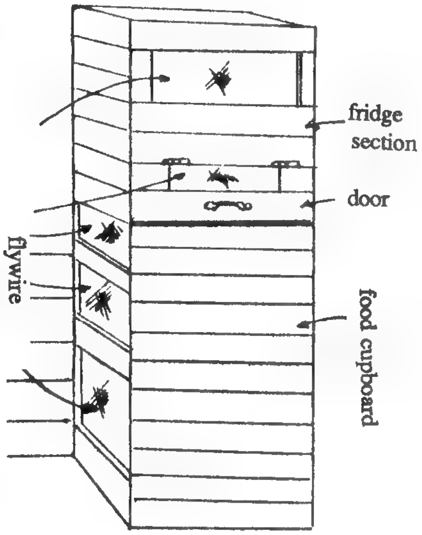
Beneath this section and sealed from it against rodents is the food cupboard which has a door access from the kitchen and flywire sides to allow ventilation across shelves as shown in the diagram. The back eastern wall is completely clad and lined with sisalation.

In building the cupboard we adjusted the stud spacing to allow for positioning the fridge between studs. The cupboard was framed in 3in x 1 1/2 in timber and attached to the wall frame. Then the rear of the cupboard was lined in sisalation and clad. Shelving was done with left over verandah decking and the sides were covered in flywire. The gas piping for the refrigerator comes down the side of the food cupboard through the floor and away to the gas bottle.

I would have preferred to place the unit on the cool southern wall, but this was not possible. The result, nonetheless, is quite good.



View from inside kitchen.



View outside.

Home assembled 12 V refrigerator

By Patrick f. Howden

Very low power 12 V fridges?

The short answer is that there aren't any. Others are badly designed with a great need to redesign. As a fridge expert, I should rate as modest, because the last I used was a $15 unit in the USA , circa 1964!

Fridge alternatives. Food preserving can be traced to thousands of years BC, right through the multinational Iron Ages. Give some thought to whether you really need a refrigerator. Few foods need it, mainly dairy produce and meat; certainly not honey, jam, eggs, margarine, bread (keep airtight) or drinks. Store greens in a vase of water or in the original soil ball, seal carrots in a plastic bag on the ground and in the shade, tomatoes on the shelf, root crops in peat or sand; then smoke, dry or pickle meat, fish, etc.

Food preserving alternatives include: salt, sugar, honey, gases such as SO 2, C02, freeze drying, canning, vacuum (a vacuum fridge?), smoke, sun, heat, drying, oil, pickling, spices, enormous pressure (bottom of the sea), radiation, electron beams, chemicals (nitrates), excluding fresh air, fermenting, sprouting, bacteria (yoghurt), cooking, shelf storage (fruit & vegies), cool cellar, Kalgoorlie safe, river, dam, water bag in shade and wind, deep freeze (deep hole in the ground with a shaded, thick insulated cover), alcohol, storing live 'on the hoof', storing winter ice for summer, or placing food outdoors in winter.

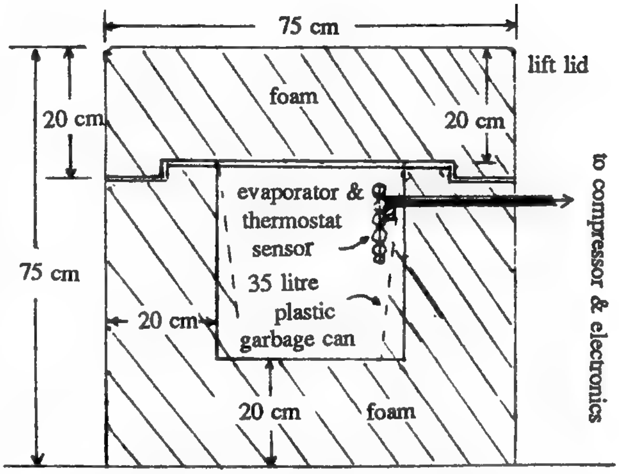
Fridge drivers. So you still need a fridge? My book **Eco-logistics** describes many types of cooling phenomena, mostly power thirsty compared to the mechanical compressor variety. That is, unless you have excess heat sources (kero, solar, wood gas, fireplace, waste heat ...). However, mechanical compressor power can be derived from any good shaft rotation such as a water wheel, electric engine and wind, even bike pedalling. Meantime, let's stick with the most feasible, the 12 V very low power electric compressor freon fridge.

A few pointers:

- Top loading saves losing your cool.
- Ideally put fridges in a windy, shady, cool spot outside. A tiny fan and regular cleaning helps with condenser coil efficiency (and saves battery current).
- A communal fridge is cheaper to run compared to one unit per family.
- 4^{0} C is plenty cool enough, though on hot days try 9^{0} C. Use a thermometer.
- Don't put hot or warm food in the fridge. Rapidly withdraw exactly the quantity of food (e.g. butter) that you need. A thermos can keep picnic food cold.
- A fridge was by far the most expensive of all our appliances.

Redesign. 35 litres is a good small family fridge which, coincidentally, has a 35 cm diameter. Now there isn't one commercial *Esky* style fridge I can find with more than about 1 inch of insulation (except perhaps the specials by *Norcast* Refrig. Co. of Caloundra, Qld.) This is absolutely ludicrous if we are to radically reduce the average current of 2-4 amps consumed by most 12 V fridges (and save buying more solar panels).

Average current? Most small 12 V fridge motors, when running, consume about 5 amps. With clever shape, insulation, placement, ventilation, thermostat usage design, the motor should be 'ON' possibly 5-10% of the day, or .25 to .5 amps average. You can confirm this by connecting an electro-mechanical clock (battery and moving hands) via a safety resistor to the compressor motor, after first setting the hands of the clock to 12 noon at 12 noon. 24 hours later note that clock time equals 'ON' time in 24 hours. Easy.


75 cm
lift lid
foam
20 cm
20 cm
evaporator & thermostat sensor
35 litre plastic garbage can
to compressor & electronics
75 cm
20 cm
20 cm
foam

Cylindrical 35 litre polyurethane covered garbage can fridge.

The cool box. The cheapest fridge design could be to add 20 cm of foam to *Esky* type units. By good luck, we found a $7 plastic garbage can at Franklins having a lid that mates neatly when inverted, to have exactly the right volume. The best insulation you can get is polyurethane rigid foam, which you buy in tins A+ B and which should be well heated to 40^{0} C before mixing, a trick of the trade.

My extensive math design library (anyone need such help?) told us that to be effective, there must be about 20 cm of foam surrounding a square cylinder (diameter equal to height), including the cool box lid, that is the whole garbage can. An ideal spherical shape was too tricky. Observe that these dimensions infer 1/3 cubic metres of foam and 4 square metres of surface area to be painted with sticky, water-based *Sealfast.*

Foaming. Friend Mike set the can and the 75 cm (=20 +20+25) diameter sheet metal mould upside down, likewise the lid. Hopefully, you can find a slower reacting foam mix than the stuff we got (see *Insulation* in the Yellow Pages). All I can say is experiment on tiny bits of warm A+B. We used 4 litres of each, but bargain and avoid sales tax somehow. The sketch shows the design. The top step is best cut later. If ever the insulation gets wet, it's useless, so paint all foam surfaces, inside and out, with *Sealfast*, leaving a slot for the compressor pipes and thermostat. All goofs can be filled with crumpled slabs of foam before painting. Certainly foam costs less than extra solar panels.

Some experts mix A + B in a plastic bag, but hurry if you do!

Cheap foam alternatives. Scrounge foam bits and stuff into a 75 cm container.

We mount the unit in a breezy, dark space under the house, with a short, enormously thick cable to the 12 V battery.

Compressor unit. Solid state Peltier Effect coolers are cheaper than mechanical compressors, though three to five times less efficient for the same cooling power. Thus we chose the reliable Danish *Danfoss* (Australian agent, Russell Armstrong Pty. Ltd.) shown, with its brushless sealed motor system (BD 2,5 102Z3010), clever electronic control (BD 2,5 102N3015) and high temperature thermostat (#8 090 B711), able to control from + 11° C to below freezing.

Terminals are provided for the thermostat and a very low power fan (theirs is high power) if you need better efficiency, or there are no breezes around. The electronics is fail safe and protects the battery. The instructions are great and come in nine languages (I'm starting to learn Finnish as a result!).

A few hints:

- Bargain to fever pitch, also save tax. You can save hundreds of dollars on this lifetime system.
- If there's a big distance between the solar panel and the fridge, still put the battery next to the fridge and connect with large **bolts** — no clips (not for big currents, but to avoid electronic sensing cutout).
- Connect the test clock (see above) to the fan terminals.
- After switch on, wait to 30 seconds before autostart. The thermostat can be set to freeze or deep freeze (at higher average current).

Tests. To be conservative, we did the tests with the Queensland sun shining on the box and the condenser cells by day and set the thermostat at an unnecessarily low 2° C (normally around 7° C or more). There was no fan to help the condenser.

In future the unit will be partially buried in a shady spot under the house (at least the big fridge cylinder box will be half buried in always dry and cool soil) and a fan will help the under house breezes.

Ignoring the initial heavy average current cooldown and running the system for 24 hours, using the electric clock as an ON time monitor, the motor current of 4.5 amps was only running for 1/12.4 of the time, i.e. only .363 amp average. With the changes outlined above, this should easily reach .25 amp average, as theorised, yet far better than we had hoped.

For less battery charging inefficiencies I think it's best to use the same battery that is connected to the solar panel, at least during the day.

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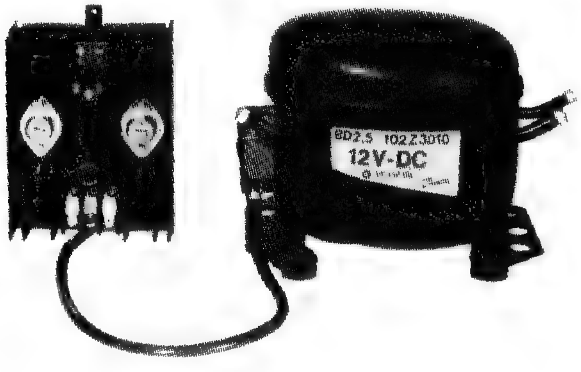
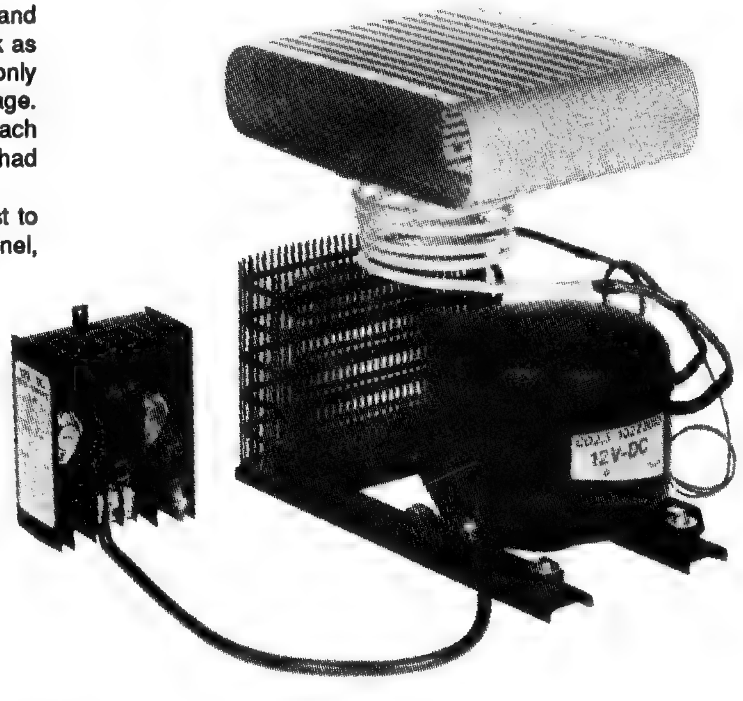
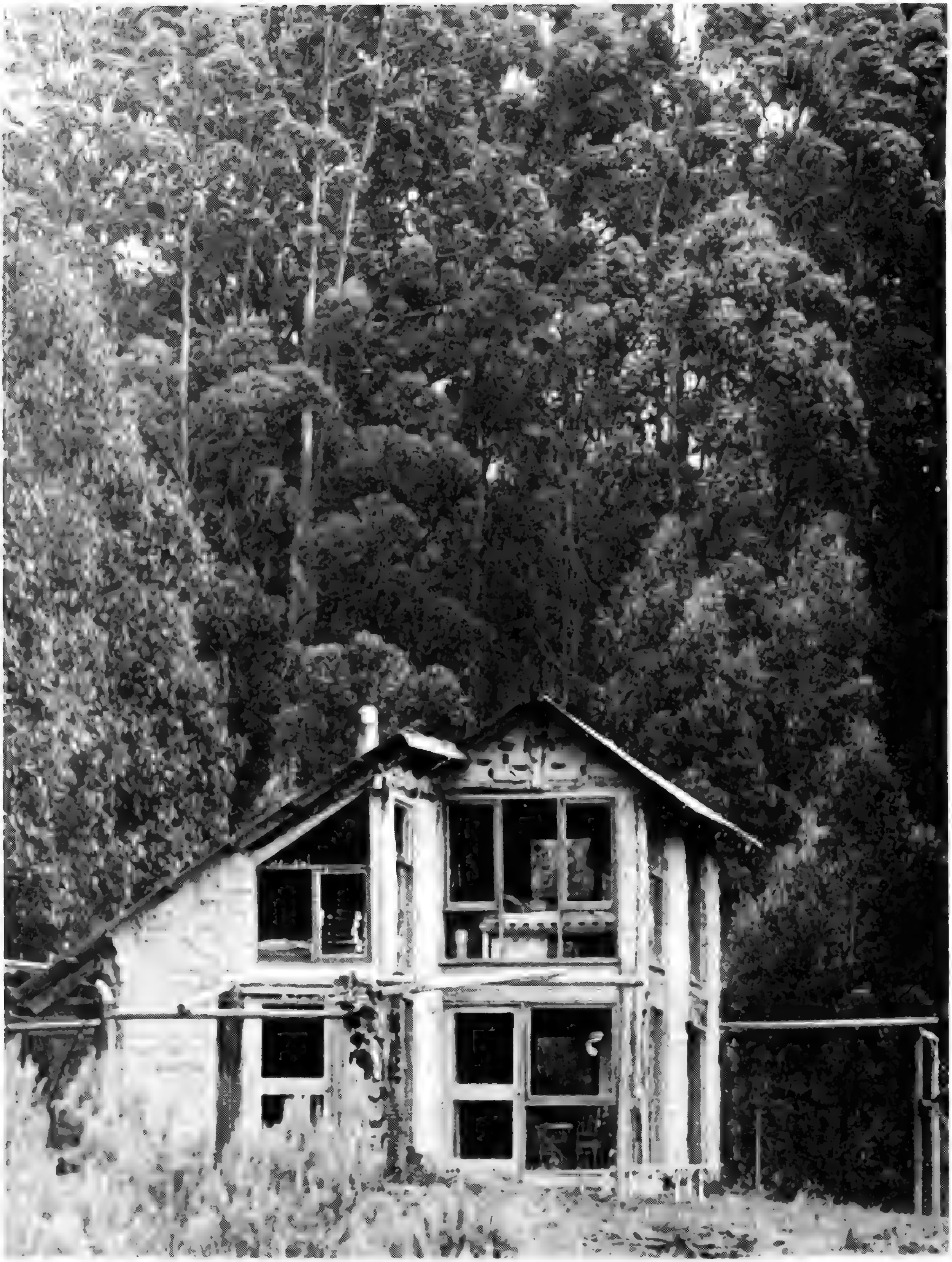






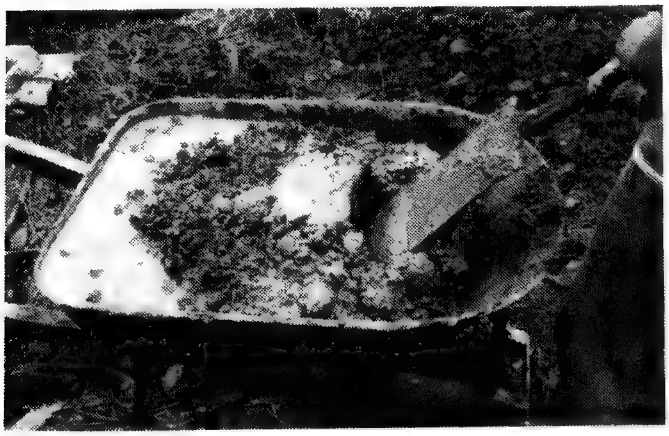
MUDBRICK PICTURES

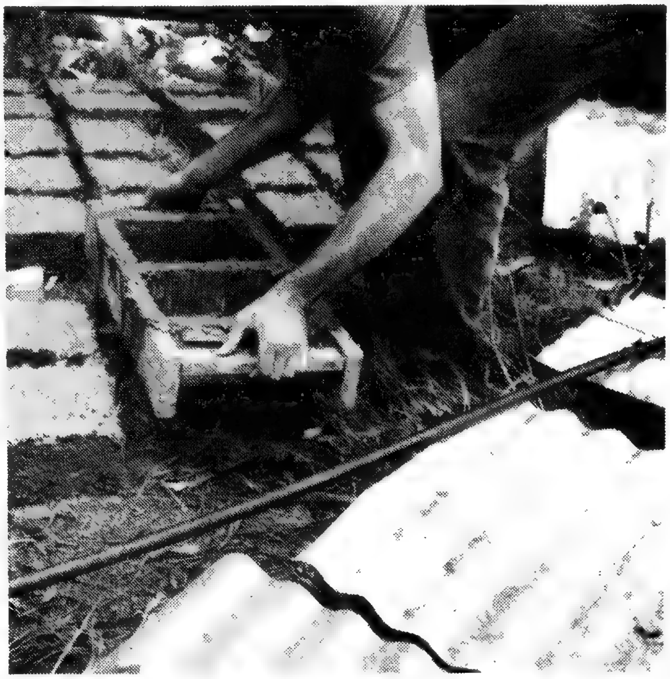
They say a picture is worth a thousand words. We think Philip Nicholas' series of photos on mixing, making, cutting, shaping and laying mudbricks is a marvellous summary of all the thousands of words we've run on building a roof over your head from the earth beneath your feet in almost every issue of Earth Garden since 1972.

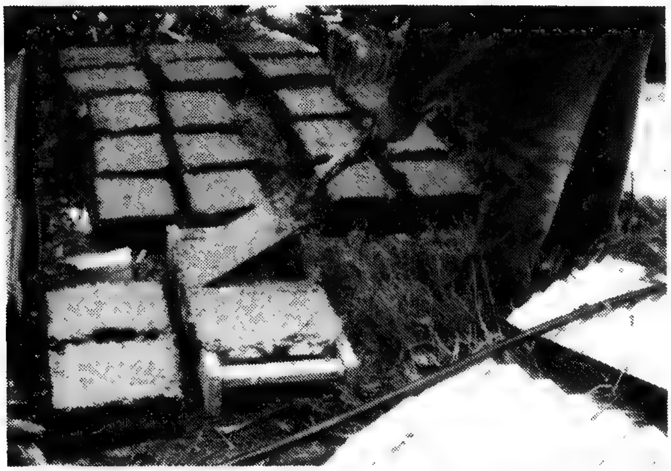
By Philip Nicholas

The first step in making mudbricks is to mix the mud. There are several mechanical ways to do this, but it's best to make several dozen bricks to test the soil you have and to get the feel of mudbrick making.

For a small quantity of mudbricks, a wheelbarrow or some other watertight vessel of similar size is needed for mixing the mud.







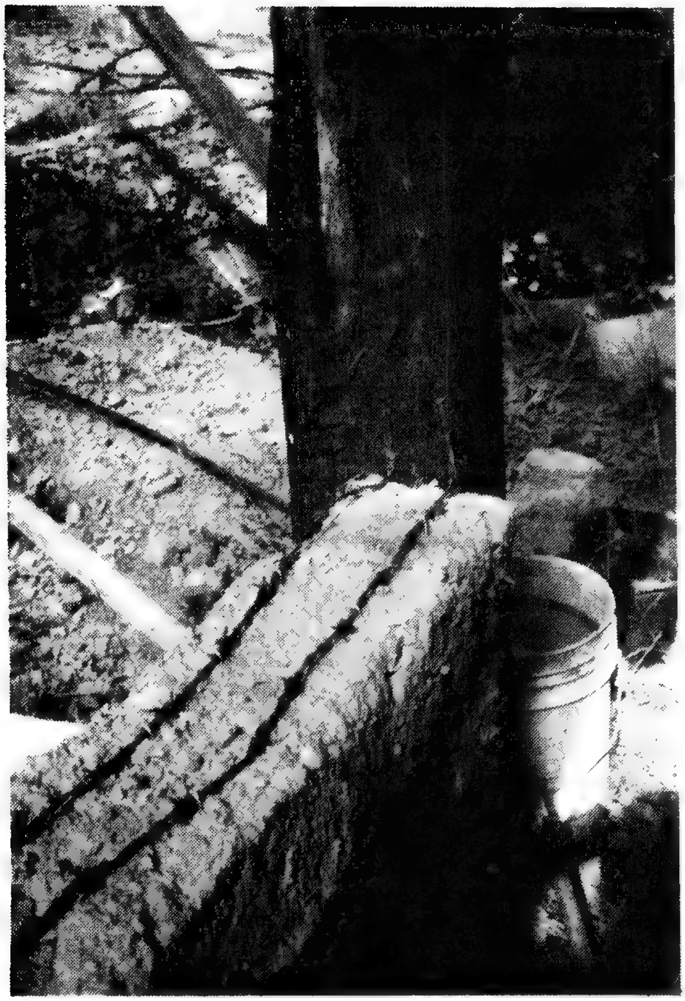
At left, Philip Nicholas' house in the bush in north west Tasmania. It has a bush pole frame, mudbrick walls and a passive solar design using the paving brick floor as thermal storage. Philip admits there might be too much window space for the Tasmanian summer in the western wall shown, but says'the rest is about right'.

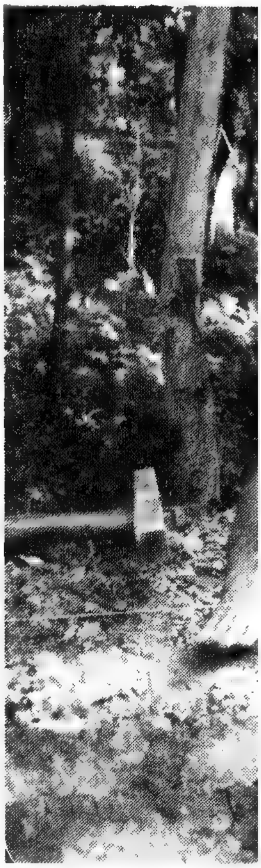
Making mudbricks. 1. Soaked mud being worked in the wheelbarrow. The mud near the spade holds its shape when tested like this, so it is the right consistency to make mudbricks.

2. Pressing the mud into the mould with the back of the spade.

3. Lifting off the mould.

4. Turning the bricks on edge to cure. Bucket and hearth brush is used for washing the mould.





mudbrick pictures

Laying mudbricks

1 (top left): Barbed wire should be stapled to the bricks and framework every two or three courses.

2 (bottom left): Lightly wet the top of the wall.

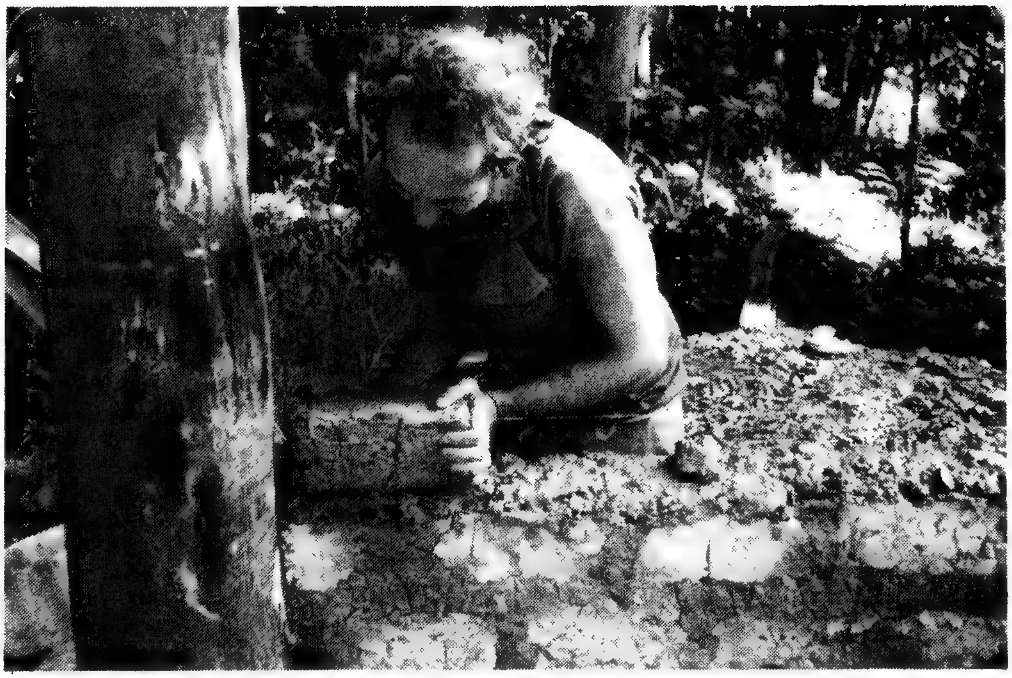
3 (left): Dunk the mudbrick in a bucket of water.

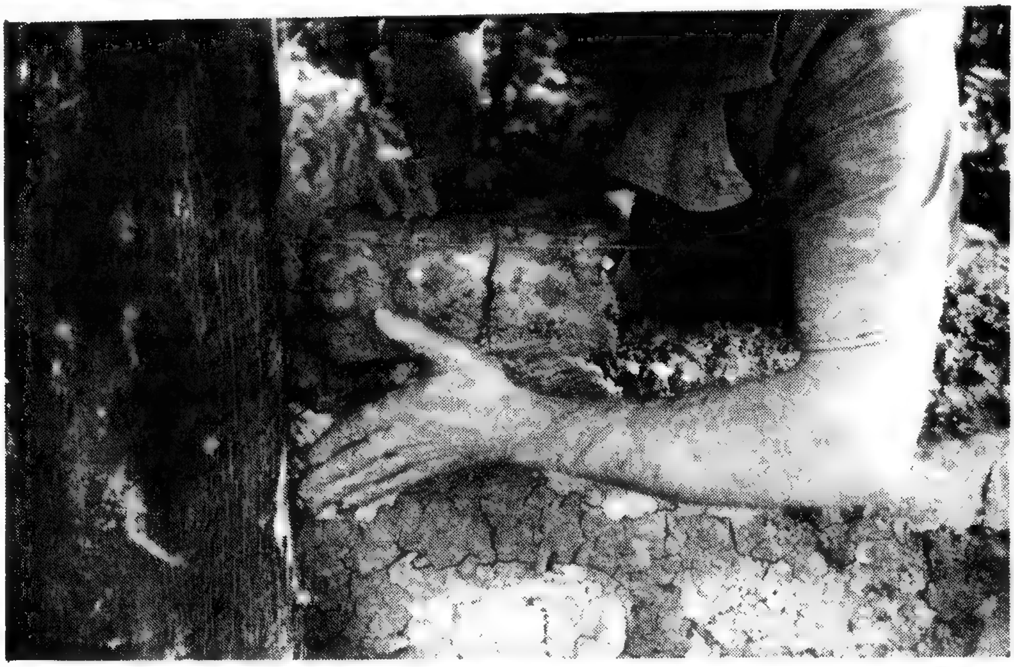
4 (below left): Pat on some mud mortar, a little wetter than you use for mudbricks.

5 (right, top): Philip places a brick — note the fishing line used as a stringline guide.

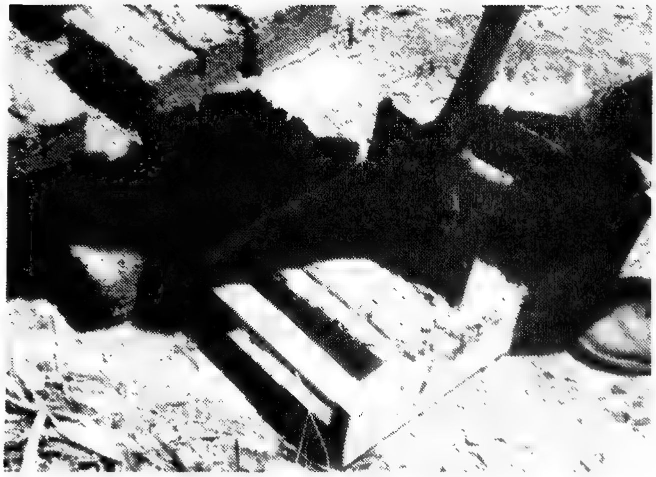
6 (right, centre): Smooth over the joint.

7 (right, bottom): Prepare for the next brick.





Shaping a sloping mudbrick.



Cutting bricks lengthwise to go around a beam.

Fill the wheelbarrow with soil, which should be mainly subsoil, though a dash of topsoil helps to prevent drastic shrinkage. Add water until it almost covers the soil. Use a spade to chop into the mixture, breaking up any large lumps. The water should now cover the soil. Leave it to soak.

Some clay soils will only need an hour or less if they are finely rotary hoed, or have fine particles, while other soils may need 12 hours soaking before the mud is easy to work.

Water or dry soil may be needed to obtain the right consistency. To test the consistency, cut into the mud with a spade, then pull back the spade and see if the mud holds its shape. You don't need to mix the entire barrowload before making some bricks.

When you have some mud ready, spade it into the mould. Throwing it in firmly helps get the mud into the corners. Push the mud down and smooth off the top with your spade. Remove the mould carefully (not just to save your back).

With some clays the mould will need to be brushed out with water after each brick is made, though with other soils you can go all day without needing to wash the mould. If the brick sticks to the mould try a wetter mix.

While mudbricks are 'fresh' they should be protected from excessive sunshine and rain. Hot sunshine causes cracking, while rain will make the bricks fall apart. Whatever you use (tarpaulin, bags, roofing iron) must allow the air to circulate as well as providing protection for the bricks.

As soon as the bricks can be turned on edge to complete drying, they should be. Most books say this will take three days, but I could almost always turn my bricks within 24 hours. Once the bricks are on edge they are much safer and will stand up to full sun and some rain. When the bricks start to look dry they can be stacked up to complete drying out. This may take up to three weeks, depending on climate, season, etc.

Shaping bricks. In general it's easier to cut the bricks while they are still wet, so take the opportunity to make half bricks and other shapes you may want. Sloping bricks are handy to fit against a sloping roof, which is much easier than using wet mud in the highest part of the building.

Mudbricks may also be cut when dry using a bow saw or an angle grinder if you have the tool (and the power). Some books recommend cutting the bricks with a small axe, but often this just breaks the brick while wrecking the axe!

Philip cuts a brick with a bow saw.

RENDER FOR INTERNAL WALLS

I've had very successful results from the following procedure.

First fill larger holes and cracks with mud, or a mud/sand mix. Spray the wall lightly with water and apply a coat of fresh cow manure, mixed 50-50 with thin slurry or muddy water.

Brush this over when dry with a coat of muddy water of the final colour. The final coat is muddy water and *Bondcrete*, mixed 8 to 1.

This gives a dust free surface strong enough to withstand childrens' fingernails, but not hammer blows.

The top coat will dry a little darker than plain muddy water. Try some test patches and experiment with the colours of your clay.

Philip Nicholas described his 12 V solar electric system in **Lights in the Bush** in Earth Garden 46 (and Energy Works!).

Glazing skills

CUTTING GLASS

By Dr. Robert Rich

Glass is not a solid, but a 'supercooled liquid'. It is a liquid that is so sticky inside that it takes 30 to 50 years for a vertical sheet of glass to become visibly thicker at the bottom than at the top. Mechanical energy, such as from a scratch or hard knock, allows the glass to crystallise.

Glass is very hard, so it is practically impossible to **cut** it. Instead, we encourage it to crystallise along a line of our choosing. Here is the way to do it.

Set up an absolutely flat, level work table, with a firm but soft surface. Glaziers cover a table with baize. It looks like a billiard table without the pockets.

At first practice only on brand new 3 mm thick plain glass. Old glass has been subjected to vibration and knocks in the past, so it takes skill (and luck!) to get it to break along the line. The thicker the glass, the more difficult it is to cut, while etched or patterned glass is obviously more difficult.

The surface of the glass along the line to be cut must be absolutely clean. In particular, it must be free of grease, even handprints. I routinely use methylated spirits to wash a strip with the location of the cut in the middle, even if the glass is straight out of the shop.

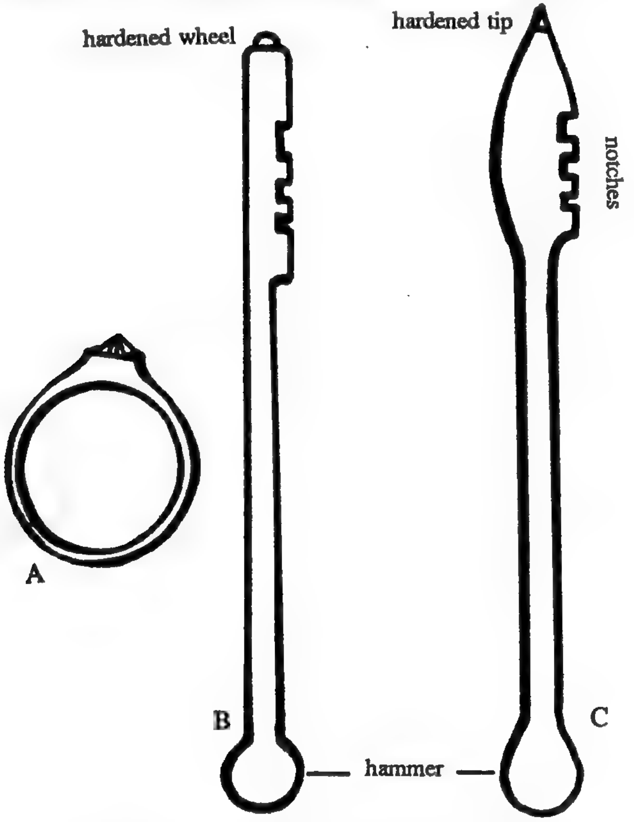


Fig. 1. Glass cutters. A. Diamond ring will work! B. Wheel cutter. C. Cutter with hardened tip.

Old glass can be washed with soap or detergent and water first, then with metho.

Use a straightedge and a felt point pen to draw the line of the cut on the glass. Curved lines (e.g. for leadlighting) are done by cutting out a cardboard template to use as a guide.

A **glasscutter (Fig. 1)** is used next. The most usual cutter has a specially hardened wheel which will scratch a line into the glass — if it is sharp enough and if it doesn't slip on a thumbprint. These wheels wear out quickly, especially if you press hard when using them. I prefer to use a cutter with a wedge shaped hardened tip (often sold as a 'tile cutter') because it holds its edge longer.

It's a good idea to dip the cutter in kerosene just before you use it. This reduces slipping and makes the cutting edge last longer.

Place the straightedge (or template) parallel to the drawn line, but far enough from it to allow for the thickness of the cutter. Hold it firmly so that it won't turn or move during the cut. Pull the cutter along the felt point pen line with a light but firm, smooth action. **All you are doing is scratching, not cutting,** so there is no point in pressing hard.

Do not go over the one stretch more than once, or the glass is likely to crack off to one side as crystallisation veers from one scratch line to the other. However, if the cutter has skipped a stretch, you'll have to dip it in kerosene again and go back and fill the spot. Glass is a bit like toilet paper: it never breaks along the dotted line!

The next thing is to place the straightedge under the glass, as in **Fig 2**. The scratched line has to be exactly aligned with the straightedge under. Bear down on the larger glass area to stop it from lifting and snap the smaller bit sharply downwards. New, thin glass will almost always snap cleanly along a good scratchline.

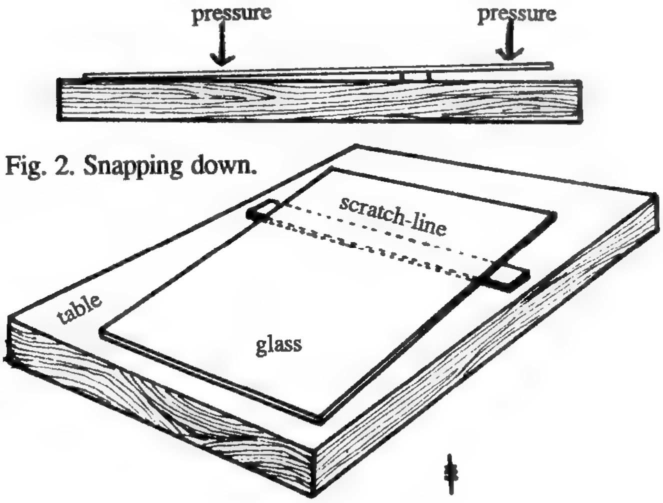


Fig. 2. Snapping down.

Thick or patterned glass. With thick (6 mm and over) or patterned glass, it is necessary to develop the scratch — to get the crystallised line to go deeper into the glass. This is done by tapping the underside of the glass, all along the scratchline. Glasscutters have a little ball or thickening somewhere on the handle for this purpose. As you tap-tap-tap along this line, you can actually see the scratchline getting deeper along short stretches. When you reckon you have it deep enough, you have to collect your courage, then snap.

If the offcut is very narrow, there may be insufficient leverage to allow it to be snapped off. Also, if the snap was imperfect, there will be little jagged bits left behind, sticking out of the edge behind the scratchline. The glass has to be nibbled away in both these situations. It's best to develop the scratch by tapping on the underside first. Then use the notch on the glasscutter which is the same thickness as the glass, or a pair of pliers, to snap off excess glass in small sections. This never gives a clean edge, but it's usually good enough to be covered by putty. Use a sharp downward motion rather than a timid pull.

PUTTYING

Glazier's putty is English whiting and linseed oil mixed into a stiff dough. The alternative is plastic caulking compound, which is dearer, but has three advantages: it never becomes brittle but cures to be flexible and resilient; it is thinned with water rather than oil; and it doesn't taste nice to possums and rodents.

The function of putty is to seal the gap between glass and its mounting (timber sash frame or lead **came** — lead strip — in leadlights). It also acts as a shock absorber. The glass is actually held in place by other means. In a timber frame this is usually by **sprigs**: tiny sheet metal triangles hammered into the edge of the rebate. Very small nails are also suitable.

Bare timber makes putty dry too fast. The timber surface to be puttied should be primed at least the day before and clean. The glass should be about 5 mm smaller in each dimension than the space for it, because there are three sources of size change: the frame moves in response to moisture changes, new glass expands slightly over time, while heat (bright sun or bushfires) makes glass expand.

Handling putty. Watch a glazier applying putty. He picks up a lump, kneads it, then a thin, even ribbon seems to flow magically from his hand and stick neatly in place.

You won't be able to do it like this, us mortals have to be content with slow motion. Repeatedly squeeze the top of the lump between the index finger and the edge of the thumb (near the joint). This extrudes a little putty. Press this into place with the ball of the thumb. Follow up by pressing on the surface of the ribbon or putty with fingers on the other hand.

Putty should have the consistency of well chewed chewing gum. *Too dry* is easy to fix: a few drops of linseed oil (or water for caulking compound). *Too soft and sticky* is more of a problem. If there is no dry stuff to mix in, roll the ball of putty over a dry, absorbent surface (paper or lint free cloth).

Store linseed oil putty under a layer of water. It won't mix, but keeps air in the tin from hardening the putty. When using the stuff, dip fingers and putty knife in water (you want it to stick to the window, not to your tools).

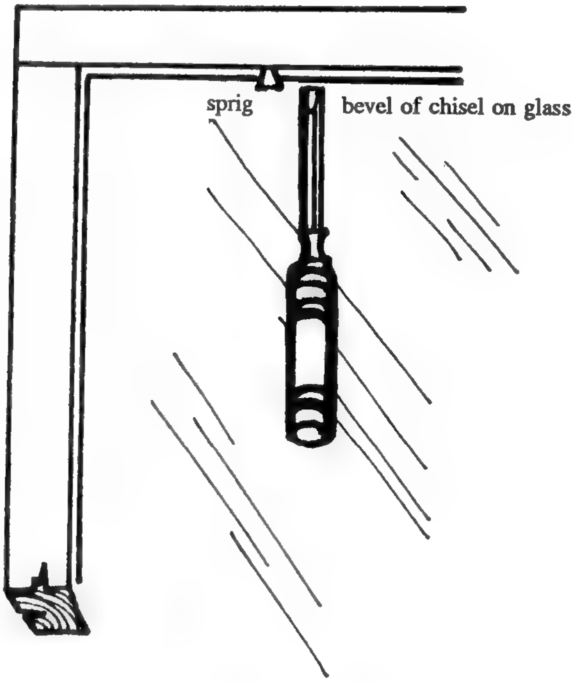


Fig. 3. Using the edge of a chisel to hammer in a sprig.

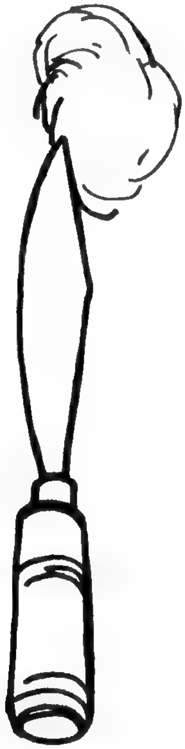


Fig. 4. Putty knife.

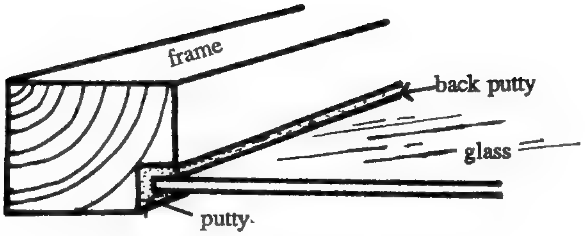


Fig. 5. Cross section of the finished job.

Mounting glass involves three steps. First, a thin bead of putty is applied to the corner of the rebate, all around the sash frame. The glass is pushed into the putty, with pressure being applied only around the edges. If the pane is too large and heavy for the putty to hold from slipping down, put a couple of 2 mm-3 mm thick temporay wedges under it. Sprigs or nails are then hammered into the timber. They must lie flush along the outside faces of the glass. They must not angle in, or they may break the glass.

I use the edge of a 2 inch chisel to hammer them in, sliding the bevel of the chisel along the glass surface (**Fig 3**). A fixed pane needs at least three sprigs or nails on a short side and four or five on a long side. An opening sash needs them at about 200 mm spacings.

A second ribbon of putty is then pressed to the outside face of the glass and smoothed off with a putty knife. This has a straight and a rounded edge (**Fig 4**). A flexible, straight edged table knife will do.

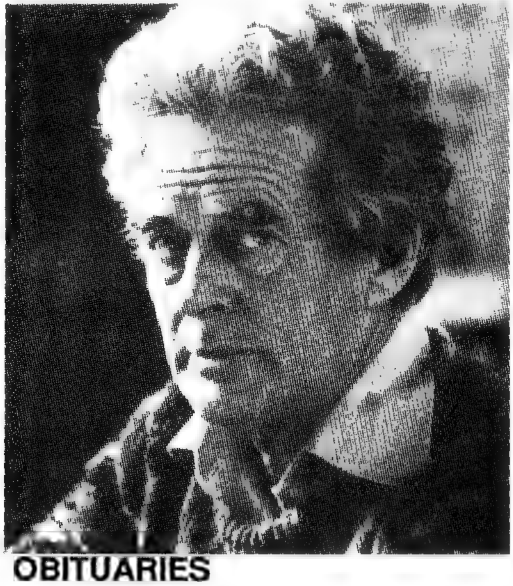
The outside edge of the putty should be flush with the outside edge of the rebate. On the glass, the edge of the putty should be cut straight, just below the inside edge of the rebate on the other side of the glass. **Fig 5** shows the finished job.

Use the knife to trim off excess, bits of back putty as well and press putty into corners as if it were mitred (45^0 join).

Let the putty thoroughly cure before painting it.

The Earth Garden Building Book

Mudsmith Bob Rich and Wordsmith Keith Smith have laboured long and hard to put together a comprehensive book on how to build an affordable house from earth, stone and timber. The manuscript is complete, so watch for this 'learner builder's manual', which should be in print in late 1987 or early 1988.



OBITUARIES

Alistair Knox.

Neil Douglas took us to meet Alistair Knox and his wife Margot at their beautiful mudbrick home in Eltham, outside Melbourne, in 1972. That house, which was recently sold, will always remain his monument, as will the 1,000 other earth houses he designed. Alistair died on July 30, 1986, aged 74.

After working on his first mudbrick building in Eltham in 1947, Alistair Knox became a key figure in the revival of mudbrick building in Australia which began in the late 1960s. His motto was "We are what we stand on" and his vision of 'environmental housing' had a great influence on the philosophy of the conservation movement. Alistair was the author of several books , including **Alternative Housing** and **Living in the Environment.**

His homes seem to fit into the bush around them. They are usually large and characterised by strong timber beams and supports, clerestory windows, open fireplaces, infilled mudbricks and large window areas.

Ken Kern

Ken Kern, author, builder, designer and stonemason, died on February 13, 1986, when an experimental clay and bamboo dome he had built collapsed on him as he slept after a heavy storm. He was aged 59.

He inspired amateurs all around the world to become builders with his series of Owner-builder books. Starting with **The Owner-Built House** in 1961, they include **The Owner-Built Homestead, The Work Book, The Healthy House, Stone Masonry** and **Fireplaces** which are all on our bookshelf, many sent to us for review with a personal note.

Ken Kern wrote about low cost buildings, the use of natural materials like earth, stone and timber and the development of skills and self reliance. His ashes have been interred at the mountain homestead in the Sierra Nevadas of California where he lived with his wife Barbara.

A wetback chimney

By John Vukovich

Some stoves are referred to as 'wetbacks' when they have a water heating system in them, so I guess the system we use could be called a wetback chimney.

This system uses a water heating coil in the chimney and can be fitted to an existing chimney, as we did in our Stage 3. Our heater was referred to as 'the water heating brick barbeque' in the article **Ferrocement roofs** in Earth Garden 49.

The system was built in three stages of efficiency, to match the urgency, measured in radius of collection, of disposing of large piles of firewood which were restricting easy passage around the site of our proposed house.

Construction materials on hand consisted of recycled bricks, steel beam offcuts, common garden variety 12 mm hose, 25 mm polypipe, various pipe fittings, used 12 mm copper tube and a black plastic 200 litre drum (formerly containing pickled olives) bought from Fawcett Bros. of Sydney for $10. Other bits and pieces purchased during construction may have cost about $30.

Feed water was to come from a creek water storage tank which was at an elevation just high enough to gravity feed to a drum on the roof of our laundry/shower hut.

It was decided that the chimney would have a one brick length square opening and that the firebox and flues would be the same one brick width, which suited the steel we had for the hotplate and dampers. There were to be two flues, so that heat from the fire could either pass or bypass the water coil by adjustment of the dampers in each flue.

This arrangement was appreciated later when enthusiastic stoking of the fire boiled water in the coil, causing frightening rumbling and hissing noises, as well as buckling the hose leading from the coil. Despite this display, everything held together, but we still worked the dampers to tame the monster.

Stage 1. A concrete pad was poured for the base and the brickwork commenced. A coil of three loops of 12 mm copper tube was built into one of the flues with each end projecting through the bricks. Sliding steel plate dampers had been provided for, below the level of the coil in both flues. When the chimney had been informally built to the height of the as yet unplastered roof, angle iron brackets were built into the chimney and spanned across to a pole roof beam. These brackets were covered with ferrocement, to be joined to the roof later, and the resulting platform was used to support the hot water drum. The chimney was continued to a height above the drum.

The 25 mm polypipe line from the creek water storage tank was taken up to the drum and fitted near the top. A ball float valve was placed inside the drum and connected to the polypipe fitting so that the water level in the drum would be controlled to about 100 mm from the top. A hole drilled through the screw top lid of the drum acted as the pressure relief.

Three connections were made in the side of the drum for 12 mm garden hose by drilling a hole in the drum to fit a rubber wiring grommet. The serrations on one end of a 12 mm polypipe connector were filed off and that end pulled through the grommet in the hole in the drum. With the correct size hole and grommet this proved to be watertight. Garden hose was pushed over the serrated end of the connector.

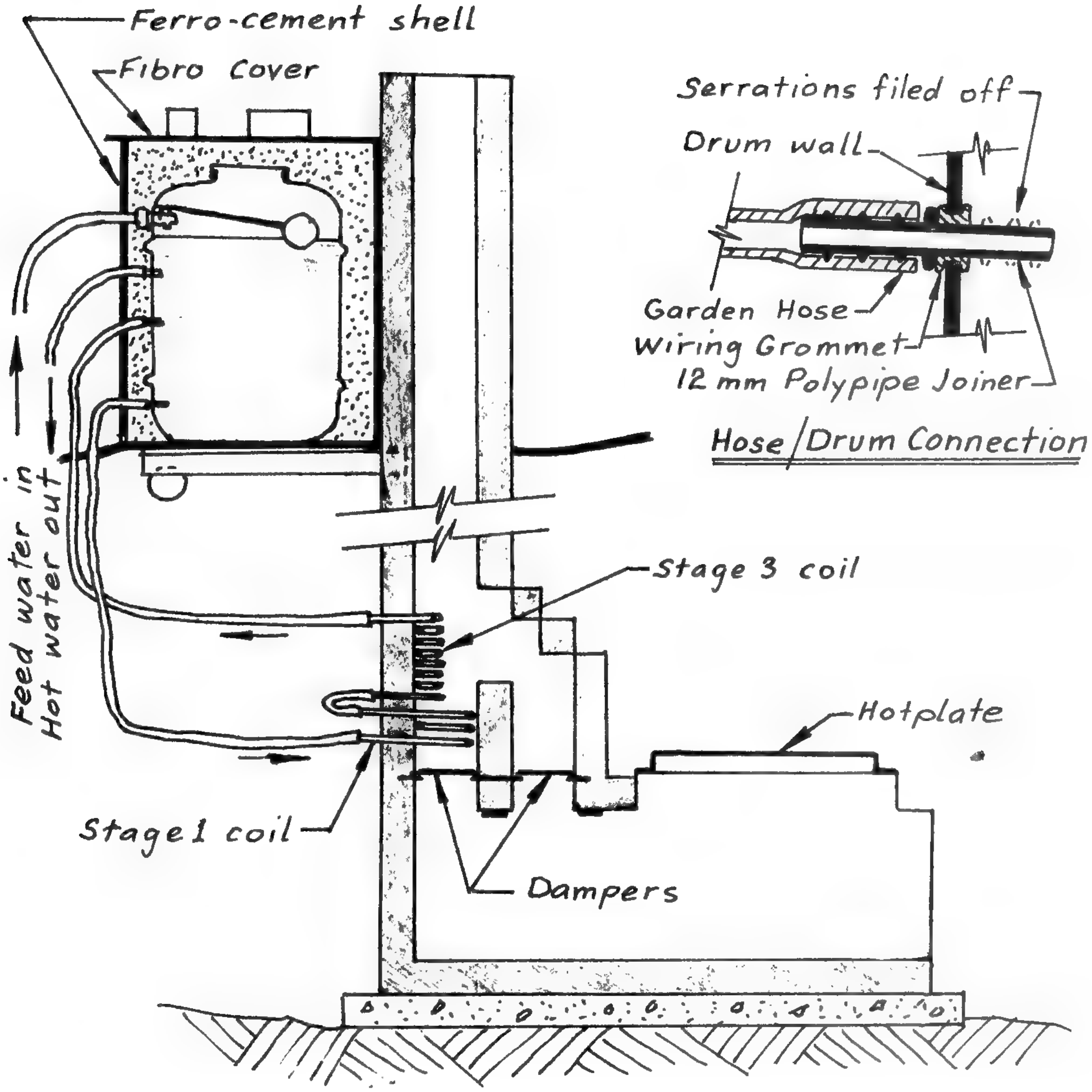
The middle and lower hoses were connected to the copper coil and the upper hose was connected to the shower and laundry taps. The hoses were fitted to the coil with screw type hose clamps.

Stage 2. The inefficiency of water heating consumed wood until the collection radius was large enough and we were weary enough to commission Stage 2, i.e. to insulate the hot water drum.

By now the ferrocement roof of the hut had been plastered, so we proceeded to adorn it with a ferrocement cylinder. Weldmesh was formed into an open ended cylinder with a diameter about 150 mm larger than the diameter of the hot water drum and two layers of 12 mm birdwire wrapped around the Weldmesh. This was placed over the drum and plastered, joining it to the platform and the chimney.

The space between the drum and the cylinder was filled with accumulated insualtion (recycled ceiling batts, broken up polystyrene, fruit cases, cork from a discarded commercial refrigerator, etc.) and a piece of fibro was laid over the top and weighted with a couple of bricks. Now we were able to light the fire in the afternoon, have showers at night and still have hot water left next morning for the laundry. The crew approved this step towards civilisation and the diminished amont of firewood needed to be collected.

Stage 3. We no longer had to nimbly negotiate logs and branches around the homesite area and pasture was popping up to keep the goat happy, so to further decrease the consumption of firewood, Stage 3 was installed. This



was the addition of a further heating coil.

A 3 metre length of 12 mm soft copper tube was fitted with sand (to stop it kinking during bending) and shaped into a coil with an outside diameter of 100 mm by winding it around a steel pipe. The sand was then washed out and the ends of the tube cut off so that the coil would fit down the chimney.

Holes to suit the ends of the coil were drilled in the flue above the first coil before we did some 'fishing'. One person lowered the coil down inside the chimney while another poked rods through the holes in the flue until eventually the ends of the coil were sticking out through the side of the flue. The hot water hose was rearranged so that the new coil was in series with the old coil. Clamping the hose onto the coil held it in place while the holes in the flue were plastered.

Stage 3 has been in satisfactory operation every day for over a year and has reduced wood gathering from a major chore to just one of the many. We still have umpteen tons of dead wood on the ground but now what is gathered is mostly used to burn out stumps. The resulting pasture growth now supports a Jersey heifer as well as a goat and an unknown number of wallabies and kangaroos.

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Sound advice

RECORD PLAYER FOR LOW VOLTAGE SYSTEMS

By Laurie O'Donnell

Back in August 1981, Shirley and I left the bright lights of Armidale and headed for our land at Turill. We also left behind the mains electricity, preferring to use a 12 V wind powered electrical system (described in Earth Garden 39).

We now live near Uralla and have added a solar electric panel to the wind powered system which we brought with us. So, for the last five years we have not been able to play our collection of 33 1/3 r. p. m. long playing records.

Most people will realise that a quite acceptable music cassette tape system will run directly on a 12 V supply (or less). In fact, we have been playing our small collection of cassettes on a basic player run from one of our 6 V lighting batteries. But what about our records? Should we put them all on tape so we can hear them? Or should we sell them and buy new, pre-recorded cassettes of the music of our choice?

I do realise that a 12 V DC - 240V AC inverter could be one solution to this problem. However, we feel that a large inverter would cost too much and waste too much power. The small (40 W) inverter we have (built from a kit) creates too much electrical interference to run an audio system on it and is too temperemental. *National* makes a 12 V record player, but it is not, I feel, a very sophisticated device. *Sony* makes a relatively expensive record player that operates on 12 V, but for us the price was prohibitive.

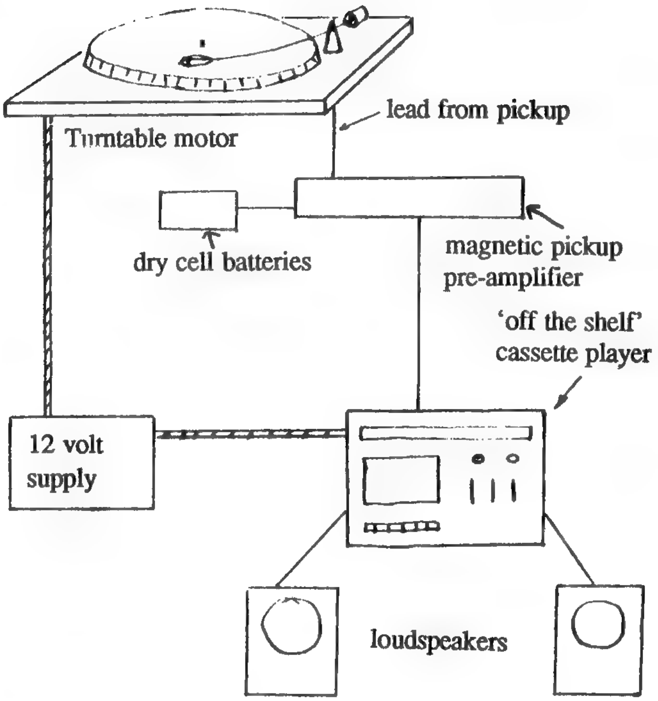
The requirement, then, was to design a system with acceptable music reproduction, which uses little power, costs as little as possible and will play good old fashioned circular records. To call the result a 12 V system is slightly misleading since it also uses two small dry battery cells, buy these are cheap and should last a long time.

The 'music centre' we now use, shown in the diagram, can be though of in three main parts.

Turntable. First is the 12 V turntable. The unit I obtained is a BSR belt drive model. At the time of writing it should be obtainable from L.E. Chapman, P.O. Box 156, Dee Why, NSW 2099 (electronics suppliers).

Pre-amplifier. Right, that makes the records go round, but what about the noise? The second part is the pre-amplifier. I chose to operate the turntable with a magnetic pickup because I already had one, but they do give good sound reproduction and help extend record life. Turntables available from Chapmans have magnetic pickups. However, here is the main problem: apparently it's impossible to operate a pre-amplifier for a magnetic pickup on only 12 V. Hence the use of the two 9 V (type 216) dry cell batteries, together providing 18 V, to operate the pre-amplifier.

Again, I already had the pre-amplifier I used. It was an old *Playmaster* design as described in past issues of *Electronics Australia* magazine. I feel that any magnetic pickup pre-amp will do. At present pre assembled units are available from Dick Smith Electronics, P.O. Box 321, North Ryde, NSW 2113 (CAT # K-3427) and probably from other electronics outlets.



Cassette player. The third main part is an 'off the shelf' cassette player. Of course, it must be one that operates directly on 12 V, such as ours, a National RX-C39. It also must have a 'line input' or 'auxiliary input' to accept the music signal from the pre-amplifier.

That's the basis of the system. You may have to enlist the help of your local electronics nut to get your player going. You will also have to provide support for the turntable. The pre-amplifier should be small enough to fit underneath the turntable along with the dry cell batteries.

Approximate costs.

Turntable	$40
Pre-amplifier	10
Dry cell batteries	2
Wire, plugs, sockets	10
Cassette player (National RX-C39)	220
Total	$282

I'm happy to discuss problems anyone may have setting up such a low voltage sound system if they contact me at 'Mihi', Uralla, NSW 2358 (send SAE), or phone (067) 782180.

HYDROMETER HOLDER

Those of you who store electrical energy in lead acid batteries and check the state of charge of the cells with a hydrometer should find this idea useful. The hydrometer is stored in a clear fruit juice bottle, with the neck cut down to fit the hydrometer bulb neatly.

This way the hydrometer is stored safely and kept clean (essential to avoid contamination of cells). It also stops acid dripping from the hydrometer after use and damaging clothing or other articles.

Laurie O'Donnell

Low voltage lights

By Peter van der Wyk

I was reading the article **Low voltage lights** by David MacMunn in Earth Garden 51 (page 48) and I must say, first of all, that the lights described are **not** low voltage lights; they are in fact 240 V lights powered by a small inverter.

Similarly, I have a 240 V juicer/blender running from a somewhat larger inverter, but that doesn't make it a 12 V juicer/blender (I have a pedal powered juicer/blender as well).

In this article David refers to a 12 V, 16W fluororescent light which has the same lumen value as a 100 W globe. There is a reference to this same light in the Quirk's ad on page 8. I assume they are comparing this light with the standard 240 V, 100 W incandescent vacuum bulb, because generally there is very little correlation between the wattage of any light and the actual light output (lumens or candlepower). For instance, a 24 V, 100 W incandescent vacuum bulb is brighter than its 240 V equivalent; the same in 12 V is brighter still and in 6 V is brighter again (at least it ought to be).

The reason for this is that as you decrease your voltage you must use a shorter and fatter filament in the light globe as the resistance of the filament must be decreased as the voltage is decreased. Now, because the filament is shorter and fatter you can run the bulb at a higher temperature, because it is less likely to 'burn out'. It is the temperature of the filament which produces the light. The higher the temperature, the brighter and whiter the light.

Drawbacks of 14 V. Again, referring back to the EG51 article, David ends by suggesting that a 14 V battery bank makes all the lights brighter than using the standard 12 V system. With incandescent lights there would be a trade off with life expectancy of the light globes. I am not sure this would apply to fluoros.

I would like to mention some other disadvantages of using a 14 V battery bank rather than a 12 V battery bank. I would normally allow a 12 V set of *Century* Home Lighting batteries to float at 14.2 V during charging; the equivalent voltage for a 14 V battery bank would be 16.6 V. On the other hand, I would allow a 12 V bank of *Exide* Faure-X batteries (like ex-Telecom batteries) to float at 15 V; and the equivalent here for a 14 V battery bank is 17.5 V. I am not so sure that a lot of the more sensitive electronic gadgets can cope with such voltages.

But my main argument against the 14 V battery bank is in relation to charging with a photovoltaic array (solar electric panels). The standard 12 V solar panel has 36 silicon solar cells connected in series in order to produce a high enough voltage to ensure some kind of charge, even under mildly overcast conditions. You can buy what are referred to as self-regulating panels and these may have as few as 30 solar cells to the panel. These panels regulate themselves by always producing a lower voltage than the standard 36 cell panel.

The self-regulating panel will stop charging the batteries as they approach or enter their float charge stage because the **potential difference** (the difference in the two voltages) approaches zero. The charging source must produce a higher voltage than the battery being charged.

I generally recommend that people should not buy self-regulating solar panels because they cease to charge when the batteries are near full and as soon as the intensity of the sunlight decreases. This means that you have got less value for your money because you get less effective hours of charging from such a panel.

With a 14 V battery bank, the standard 36 cell panel becomes equivalent to a 31 cell panel and the 35 cell panel becomes equivalent to a 30 cell panel. This means that your standard panel now behaves as a self-regulating panel and a so called self-regulating panel (e.g. a 30 cell panel) would scarcely be able to put any charge into your battery bank, even at the best of times. A 30 cell panel (or anything less than 35 cells for that matter) connected to a 14 V battery bank would be a total waste of time and money.

Regulator. With a 14 V battery bank you cannot use a standard regulator for a 12 V system, as that would prevent a 14 V battery bank from becoming fully charged.

You would need to make a special regulator for this purpose. One possibility is to make a **shunt regulator,** as described in my article in Earth Garden 51 (page 40), but with a Zener diode with a value as close as you can get between 17 and 17.5 V. A 16 V Zener diode (IN 4745) may be too low still, unless you can find one that is under-rated by about 1 V. An 18 V Zener diode (IN 4746) may be a little high, but there is a good chance of finding one that cuts in at around the preferred value. Even if it is still a little high, you can overcome that by having a 6 amp silicon diode after the regulator, which then causes a small decrease in the voltage going to the battery.

Dual voltage. I have an idea for a dual voltage system which I recently put into practice, which may offer a solution to the problem of a standard 12 V panel effectively becoming a self-regulating panel on a 14 V system.

What I did was to connect two 30 cell self-regulating panels in series across an 18 V battery bank in the same way as you would connect two non-regulating panels across a 24 V battery bank. But I treated this 18 V battery bank as two battery banks in series (one a 12 V bank and the other a 6 V bank), both banks having their own separate regulators and connected to their appropriate 6 V or 12V lights and appliances. In this case the two 30 cell panels in series (60 cells in all) connected to an 18 V battery bank would perform identically to a 40 cell panel connected to a 12 V battery bank.

If you were to increase this dual battery bank by one cell, making it a 20 V battery bank, and have the same two self-regulating panels connected to it, the panels would now perform identically to a standard 36 cell panel connected across a 12 V battery bank. But now you could have either a 17.5 V regulator across 7 cells of the battery bank and a 7.5 V regulator across the other 3 cells and use the entire bank as a dual 14 V and 6 V system.

In order to get the maximum benefit out of the two panels, they need to be identical panels. The positive connector on the one panel can then be connected directly, across to the negative of the other panel and the two wires going down to the battery bank are then connected to the remaining positive and negative terminals on the panels.

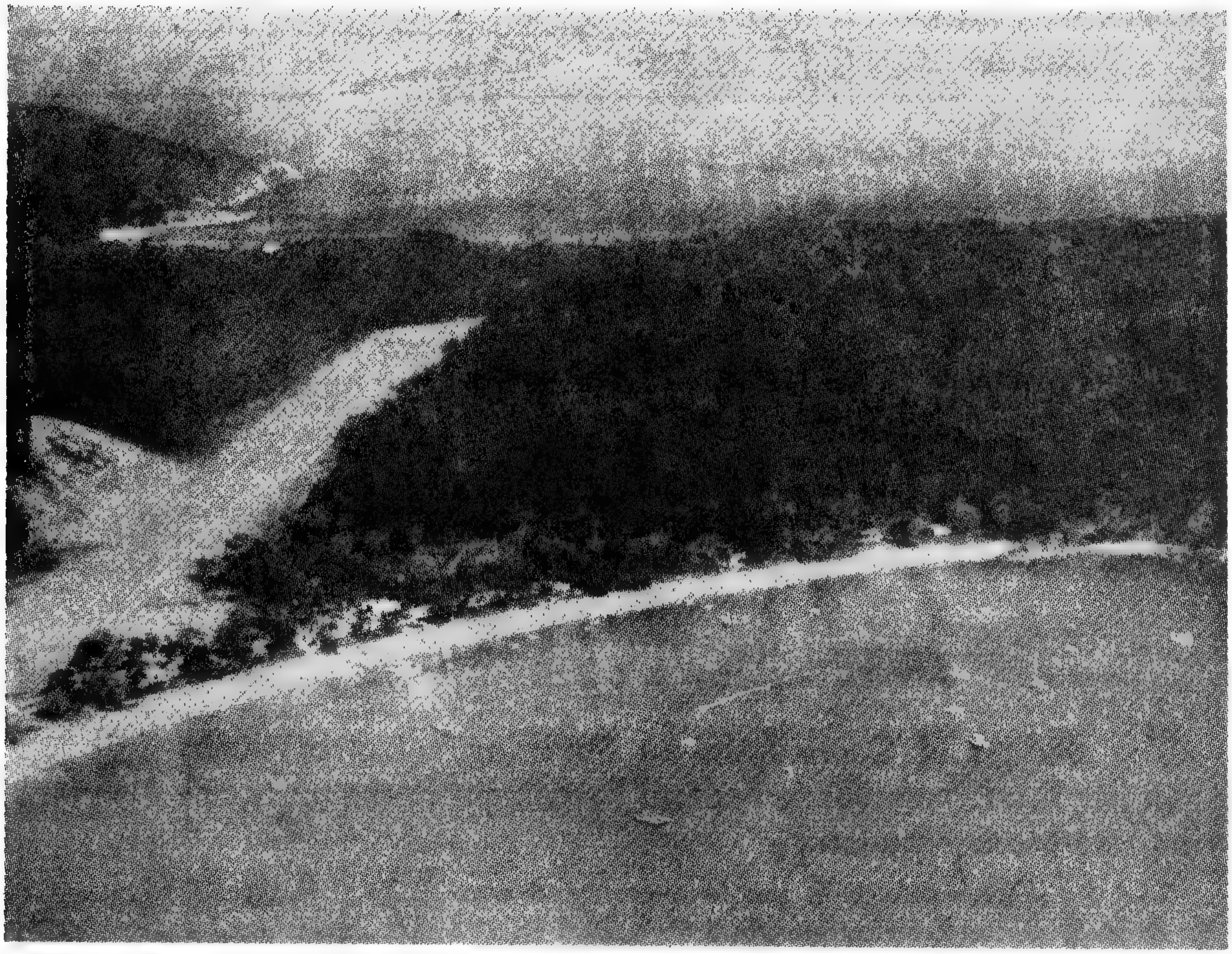
Now that I am on the subject of 6 V and 12 V systems, there is an easy way of charging a 12 V battery from a 6 V battery. All you need to do is to place a **resistor** (such as a light globe) of the preferred value between the two batteries connected in parallel. Whether you wish to charge the 6 V battery from the 12 V battery or vice versa, you cannot have the two batteries in series as they were for the two panel charging system described earlier. **How can you charge a battery at a higher voltage with a battery of a lower voltage?** You may well ask!

Dick Smith sells what they call a car voltage converter (Cat. M-9592). It is actually an inverter, or you could call it a voltage doubler. It turns 6 V DC into 6 V AC, puts the AC through a small transformer which doubles the voltage and is rectified back into 12 V DC. It was originally designed to be able to power 12 V sound systems from a 6 V car battery (e.g. the old VWs). But having both a 6 V and a 12 V supply, I was more interested in using it as a means of charging the 12 V battery from the 6 V battery in instances when my 12 V battery needs more charge and my 6 V battery doesn't.

Since it is a voltage doubler it wouldn't charge a 14 V battery from a 6 V battery. The rate at which it charges a 12 V battery varies between 2 amps and zero, depending on the relative states of charge of the two battery banks.

Peter van der Wyk, C/- Nimbin Neighbourhood Centre, Nimbin, NSW 2480.

PARADISE WRECKED



When I remember it, my inner eye is flooded with those marvellous blues and greens of unpolluted water, and the coral pools at low tide held millions of little fish, anemones, stars, urchins, shellfish, crabs, sponges and coral species, all apparently trying to outdo each other in elegance and beauty of pattern, shape and colour.

JUDITH WRIGHT, The Great Barrier Reef, in *Australia's Natural Heritage* (ACF), 1981.

By Graham Roberts

Reading Corrie Wright's article *Best of both worlds* in Earth Garden 51, I was reminded of a similar experience. I thought I should write about it and of the lessons I learnt.

Twenty five years ago, I was intent on making a pleasant life for myself. I was forever looking around for interesting opportunities. One such opportunity was the choice of living on an 'offshore' island. I found one off Central Queensland that was known locally as Silver Sands.

This island was so beautiful and peaceful that when you arrived by small fishing boat (which was the only way to get there), you could walk onto the beach and stroll through the bush and never see a footprint nor any sign of pollution. There were only one or two small cottages, built by fishermen, hidden in the gum trees.

I applied to the Queensland Government and was successful in obtaining a special resort lease of 30 acres on Silver Sands, more properly known as Great Keppel Island. With a small budget but a big heart I moved my young family to the island and started my dream lifestyle.

I now consider that what I started was the denigration of one of the most beautiful places on this earth.

My original plan was to build some *bure* style huts not far from the beach and to make a 'low key' family holiday resort which I could operate myself and provide a small income for my family.

However, my plans were soon upset when 'Big Business' and my own greed took over. I had only been on the island a short time when I was approached by the director of a Sydney firm who was interested in investing in and exploiting the beauty of the island. I am sorry to say that I became involved, as the whole concept changed from 'low key' to just another 'Tinsel Town' ripoff.

Although my new found partner wanted a big resort, he didn't want to pay a lot for it, so the whole building programme was done on a very low budget, subsidised by sweat and muscle.

The first facility I constructed was a small jetty. This was built by cutting down trees on the island, barking them and making-A frames and then using timber sleepers for the decking.

I think at this point God issued a warning, probably for cutting down the trees. The first time the jetty was used was to unload a small bulldozer. Unfortunately, the dozer fell off the jetty and drowned the operator. No one heeded this warning, so we proceeded with the building.

In Keppel Bay the tide has approximately 16 ft rise and fall, so for most of the time, there was not enough water to unload or load the barge used to transport all the building materials from the mainland. We could only work for two hours either side of high tide and hundreds of tonnes of equipment and materials was unloaded by hand at all hours of the day or night.

The original buildings were of masonry blocks, so that they would be 'cyclone proof' — and just as well, because God had a few more attempts to get rid of us, as the first cyclone hit within weeks of the first building being constructed.

As there was no blue metal on the island, all the concrete that we made was crushed coral, shovelled up at low tide. This proved to be satisfactory.

One of the hardest jobs was unloading two Southern Cross 40 HP x 35 kVA diesel generators manhandling them using large pipes for rollers. From that moment we had a 240 V lighting system and noise pollution and the island was never the same again.

I am also guilty of being involved in the permanent scarring of the island by negotiating with a national airline to build the airstrip which virtually cut the island in half.

How things have changed. I get upset now if I see one tree cut down, but in those days I was so caught up in making the 'big dollar' that I was happy to see this massive excavation work. Had it been planned a few years later, I think this airstrip could have been stopped, with the new found awareness of our environment by so many people. I'm sorry now that it didn't become another 'Fraser Island' or 'Daintree' issue.

There were no restrictions on upsetting the island's ecology as natural trees and shrubs were removed and replaced by imported exotic types. Sewerage effluent was fed into Keppel Bay and the mangrove swamps were sprayed with lethal chemicals to kill sandflies. It was also decided to use part of the mangroves as a garbage tip as it 'couldn't be used for anything else'.

All that happened almost a quarter of a century ago and what should have been left as one of the mose peaceful places on earth is now very much the opposite. Pop bands rage all night, tourist boats come and go, bringing with them hordes of people and their litter. Aircraft fly in and out from the mainland and machines run non-stop, belching out toxic waste.

However, the sandflies and the birds don't seem to annoy anyone now and it doesn't really matter that there aren't as many fish, because you can always buy frozen fish. And you can never be lonely on Great Keppel Island anymore, because there are loads of tourists. I am ashamed and sorry that the future generations will never see Silver Sands as I saw it, but it is a lesson we should learn, so no other places of natural beauty will be ruined forever.

I am scared that if 'Big Business' has its way, the whole of the Great Barrier Reef will cease to exist. The present Queensland Government has a good record of mining Australia and selling our heritage, so young Australians, beware. When I was living on Great Keppell, there were American companies doing seismic surveys, presumably looking for oil. All that information will be stored somewhere. You could imagine what would be the fate of that wonderful part of the world if oil rigs started going up.

The Government would tell us that there would be no danger, just as they always do about oil rigs and drilling platforms ... and nuclear power stations.

This photo from the *Rockhampton Morning Herald* of October, 1967, shows the air strip hacked out of the scrub at Great Keppel Island. Five aircraft flew in 75 guests for the official opening of the tourist resort.

FAREWELL FRIENDS

By Rose-marie Loro

I've cried and laughed so hard I fell off the chair ...

A tear falls as I stand reading my mail, a farewell letter from friends!

I first met them in 1981, in the local library. I was so captivated by their eagerness to help others and their enthusiasm to look to the future whilst cherishing skills and knowledge from the past, that I did a 'Sherlock Holmes' act and found every available copy of Earth Garden, which I took home and studied for a month.

I had never read such an encouraging publication, nor been so moved by the contributions both of subscribers and the editors themselves. I was driven to join the ever growing family of Earth Garden friends.

It was a firm friendship from the very first article I glanced over. I learned through the wisdom of words telling me of the wonders of the bush and the works of many Earth Gardeners. I eagerly watched projects being planned and issue by issue growing into palaces of natural beauty.

Over the years I added to my collection and kept all the magazines as the informed guidance and assistance contained in them will never be outdated. Then I gained the courage to contribute, telling of how my husband and I meet today's continuing challenges and how we succeed with help and guidance from the magazine.

I think the publishers of Earth Garden have shown a talent for work, wisdom and wit you don't meet with in other publications. They have worked solidly to give their readers 15 years of excellence in literature, covering caring for our earth and each other and helping each other and ourselves to a better way of life and living. Most importantly they have shown how sharing with our fellow human beings can enrich all our lives.

They've guided us over the years with articles on a huge variety of gardening, livestock and building. I found Earth Garden to be presented in such a way that it is both thought provoking and a great encourager of action. I've cried and laughed so hard I fell off the chair, such has been the varied content of articles from the publishers and stories from the reading contributors.

Working, whether at home or out in the public workforce, is now a challenge to be enjoyed, thanks to Earth Garden.

Another reason the publishers have become so special to me is that they encouraged me to write. I had always longed to write, but had never had any encouragement — just rejection slips with no comment attached. The thrill I felt when I saw my first story in print led me to try even harder, so I have continued to contribute, whilst learning and listening to other contributors. Many of you will know how I feel.

Fifteen years is a large part of one's life to give to others, but through Earth Garden, Keith and Irene have done just that! One of thousands, I am proud of their achievements, of their results visible and not so visible all over the land.

Two great 'Aussie achievers', now in their forties, are moving on. My prayer is that both will step into the future fighting fit, ready to take on life's new challenges, taking with them the best wishes of our 'family' and all those who have come to know them over the years.

My copies of Earth Garden magazine and the books you have written will ensure you are greatly missed and fondly remembered for all you put into your publications.

Farewell, friends ...

WHEN AN EARTH GARDENER DIES

By Irene Davey

My Father was an Earth Gardener (or maybe a farmer) from way back in the 1930s. After he died in 1972, my Mother lived on alone on what remained of the farm. She spent her time pottering with bits and pieces of garden and walking back and forth across the 10 acres, talking to a tree here and picking a few wildflowers there.

Two years ago an accident put her in hospital and she died a fortnight later. We engaged the services of a Funeral Director to organise a coffin and Crematorium booking, but we did not know who to ask to conduct the service, as Mum had not been near a church for many years. She used to worry a bit that people were talking about her behind her back, so it didn't seem right to ask a stranger.

With the approval of my brother and sisters, I said I would conduct the ceremony myself. It really was a ceremony without much ceremony. Early on the morning, we went to the farm and picked flowers and armfuls of greenery from all the favourite trees. These we took to the Crematorium and piled over the coffin.

I began the ceremony: "Dear family and friends, we are here to say a last farewell to [our Mother]." Then I gave a brief account of what I knew about her life, talked about the things she had done and achieved in her nearly 75 years and recalled what she had done for us as children and as we grew up.

Then I paused for a few minutes so those who wished to could say their own prayers, or add their own private rememberances. I finished by reading a short Bible passage, then simply said "Goodbye Mum' as I pushed the button for the coffin to disappear.

This was the cue for a lone piper to play a lament, fittingly entitled 'Flowers of the Forest.'

Fellow Earth Gardeners, in the previous 51 editions, you have written about the marriages and births in your families; I have written about a death in ours. When you have such a sad occassion in your family, think about farewelling the loved one yourself. It may seem hard at an already emotional time, but I think it is easier than listening to a stranger trying to say the things you want said.

Irene Davey, 'Windy Flat', via Urbenville, NSW.

More land lines

S.E. Queensland, 1/2 hour drive Noosa, 9 acre share in community (est. 12 years) bordered by State Forest. Heavily forested valley with creeks & waterholes. Solid, multi-level timber house, sunny N.E. aspect. Solar power, S/C and gas stoves, gas fridge, fireplace, phone, septic. Large double garage & workshop. Ample water from rainwater tanks & dam with pump. Extensive gardens, vegetable & ornamental. 100 bearing fruit trees. School bus at driveway. Price $55,000.

B. Benham, phone (071) 467207 or (03) 251521, or write 21 Bellavista Street, Glen Iris, Victoria 3146.

Spiritual community project in northern NSW. Presently running growth workshops employing principles of "A Course in Miracles" & Rebirthing. 150 acres. Community still at planning stage. Apply only if genuinely interested in awakening your spirituality and involving yourself actively in the creation of an inspiring New Age venture. Shares $5,000.

Send pre-stamped envelope to Eva-Maria & Rainer Taeni, Yulunga, Barkers Vale, vua Kyogle, NSW 2474. Phone (066) 8972311.

Lillifield Community is in the beautiful triangle of Nimbin-Kyogle-Murwillumbah. The highesat point is almost 1,000 feet above sea level. The basic framework of Lillifield is now established, with roads, homestites, communal areas, etc. Now all that is needed to make this beautiful area grow is 20 members who will each be entitled to up to 5 shares for his/her own private use and will share in over 100 acres of common land. The cost of each entitlement is $12,800, which includes the first year's service fee for rates, tractor maintenance, etc.There is a choice of gentle slopes, flat land, high land and valleys, with creeks, streams and natural pools.

If this lifestyle appeals to you, please write to: 'Lilifield', Lillian Rock, via Nimbin, NSW 2480, or telephone us direct on (066) 897224.

Cygnet — 40 mins Hobart GPO, eight year old14 sq. home on 19 acres (11 pasture, 8 bush). Home comprises 4 bedroom (BIR), large living area with cast iron fire. Electricity, gas cooking, phone, two showers, walk in pantry, verandah with lovely views. Also has 36,000 litre rainwater storage, plus two springfed dams for large vegie garden, berry fruits and small orchard. Situated at the end of a secluded valley, 5 miles from Cygnet township and includes poultry shed, haybarn, goat shed, and workshop HDP. At present it runs cashmere goats and sheep. Asking price $79,000 for quick sale.

Ring Peter Coxhead (002) 951374, or wriite C/- P.0. Cygnet, Tasmania 7112, for more particulars.

10 acres, good area, half forested, with many tall and varied trees. Valley views, picturesque setting. Includes three bedroom country home, renovated, new paint, new roof, new plumbing, slow combustion stove, gardens, fruit trees, dams. Good land, fully set up, 10 miles north east of Gympie, 35 minutes to Tin Can Bay. Price $56, 000 ONO.

J. Ambrose, M.S. 565, North Deep Creek, via Gympie, Qld. 4570. Phone (071) 833841.

Land and dwelling for sale in well established community of 360 acres of beautiful hilly, forested land on the Bowman River near Gloucester. Shares for sale include 4 acres, a comfortable two room cabin, electricity, phone, large shed. Established vegetable gardens and fruit trees, 3 water tanks, 2 dams. $22,000.

A. Simonis, N. Burgess, Upper Bowman, via Gloucester, NSW 2422. Phone (065) 585592 or (02) 9492378.

Our land has 1 river, 4 creeks, many creeklets & springs, wombats, lyrebirds, emus, bower birds and more. All forest, some open, some scrubby; mild climate of S.E. corner of Australia. State Forest on most sides. National Parks, lakes and beaches nearby. Ultra secluded, but access okay. Hate selling, but need cash. Small lots, (app. 40 acres) from $18,000. Bigger lots (over 100 acres), from $30,000, might interest partners, communities, shareholders.

Please write to Anne Martin: 4/161 Ernest Street, Crows Nest, NSW 2065, including contact phone no. if possible.

Organic mango orchard requiring little effort for substantial annual returns. Underground irrigation, packing and marketing facilities. 200 mature Bowen mango trees, 61 younger, 75 assorted fruit trees on 6 acres. Cool spacious residence, close beaches, rainforest and National Park. Walk shop, school and beautiful Crystal Creek, 80 km north of Townsville. $140,000.

Sam and Jenny Bennet, Lound Road, Mutarnee, Qld. 4816. Phone (077) 708113.

Farm, 13 miles from Warragul, Victoria, 61.5 acres, bitumen road, 35 acres pasture, rest treeferns, eucalypts, blackwoods. Abundant wildlife, rich soil. Suits berries, vegies, nuts. Extensively renovated farmhouse, combustion heating and cooking.Electric, HWS, stove. Home orchard, dairy, extensive shedding. Large trout stocked dam. Irrigation potential. Permanent creek and springs. Price $120,000.

Steve & Trish De Clifford, 'Yarrawood', Leongatha Road, Allambie, via Yarragon, Victoria 3823. Phone (056) 344253.

We wish to sell 76 acres of land at Jackeys Marsh in northern Tasmania, near the Western Tiers. It has superb views of Quamby Bluff and Projection Bluff. 3 acres are cleared, the rest is magnificent eucalypt forest with some rainforest. It has a permanent stream. It is part fenced. Good access, telephone cable on boundary, no electricity. Neither we, nor the small local community would want to see this beautiful land logged. Price $25,000 ONO.

If interested, phone Dennis or Jenny Booth on (004) 282740 in the evenings or write to Main Road, Forth, Tasmania 7310.

Queensland south, 250 acres for sale. Secluded bushland; valuable timber, red and brown soil. New cyclone proof shed 20 ft x 25 ft, concrete and steel construction with nine windows, can be converted into a dwelling. 30 minutes drive to nearest village, school, etc., 4 km to highway. Price $49,000.

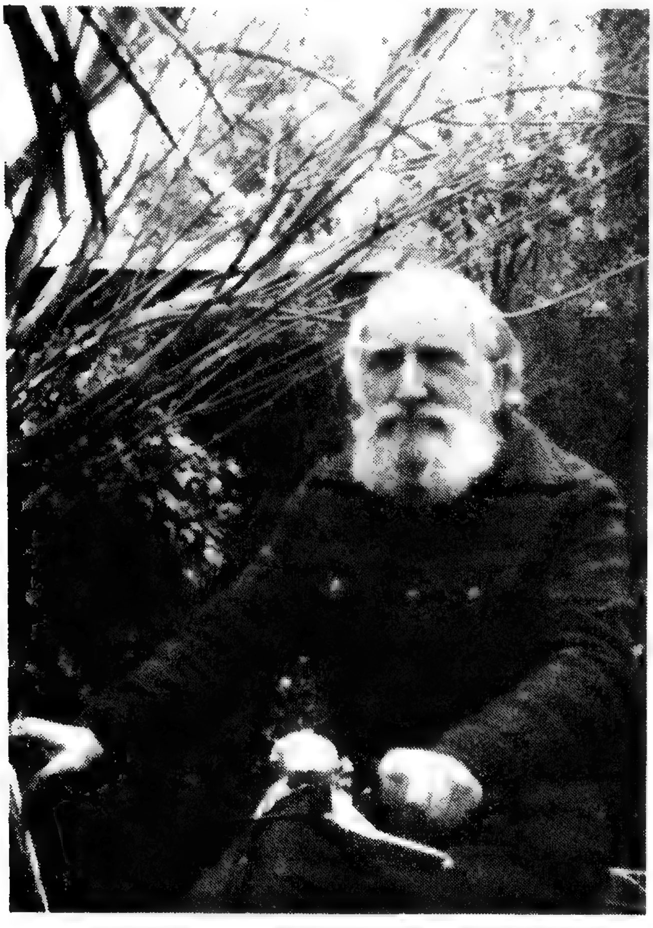
M. Chako, P.0. Box 922, Toowoomba, Qld. 4350. Phone (076) 300438.

ONLY ONE EARTH

If science sets its sights on the acquisition of power, then scientific knowledge is dominating knowledge. We know something to the extent in which we can dominate it. We understand something if we can 'grasp' it. Through scientific terms we define, and through definitions we pin things down and make objects identifiable.

But *belief* in creation only arrives at the understanding of creation when it recollects the alternative forms of *meditative* knowledge. " We know to the extent to which we love", said Augustine. Through this form of astonished, wondering and loving knowledge, we do not appropriate things. We recognise their independence and participate in their life. We do not wish to know so that we can dominate. We desire to know in order to participate. This kind of knowledge confers community, and can be termed communicative knowledge, as compared with dominating knowledge. It lets life be life and cherishes its livingness. Christian theology must remember this, its own wisdom, if it wants to make its contribution to the conquest of the ecological crisis of scientific and technological civilisation.

JURGEN MOLTMANN, God in Creation, London, 1985.



New Christian views on the ecology

(A response to Dr. Brian Roberts' call for Land Ethics)

By Jack Horner

In February 1983, Dr. Geoff Mosley, the director of the Australian Conservation Foundation (ACF), called for a five year soil conservation scheme with an annual funding of $250 million, to save Australia's soil base. (This was only a week after winds had carried topsoil through Melbourne.) A national study, he said, had shown that 51% of all agricultural and pastoral soil needed conservation work on it.

Dr. Brian Roberts, in his recent article *Who will speak for the land?* published in Earth Garden 50 (May, 1986), came to similar sad conclusions of political neglect, but his theme was concerned more with finding reasons for our historical attitudes to land, and to Nature in particular. Man's insensitive arrogance towards the land should be changed, he said, in favour of a new Land Ethics, perhaps a new striving for harmony with the landscape.

Although Dr. Roberts did not mention them, it is now realised that the Aboriginal people expressed in their religion not only social obligations to preserve the land in order to conserve the ancient Dreaming for the future, but themselves identify with their local land as a strong source of their spirituality. Roberts acknowledged the fact that religion could change our ethical views; and borrowing from a famous paper *The Historical Roots of our Ecological Crisis,* by Lynn White (1967), accused Christianity of much responsibility for land despoliation.

There is a strong case, of course, for a new Land Ethic, in view of our present crisis in ecological matters. "What we call the environmental crisis," wrote J. Moltmann, a modern theologian (1985), "is not merely a crisis in the natural environment of human beings. It is nothing less than a crisis in human beings themselves. It is a crisis of life on this

Jack Horner, writer and historian, was the Hon. Secretary of the Aboriginal-Australian Fellowship in Sydney from 1958 to 1966, secretary in 1967 of the 'Vote Yes' campaign committee (on a referendum to delete discrimination from the Australian Constitution), and General Secretary of the Federal Council for the Advancement of Aborigines and Torres Strait Islanders (1967-70).

He was a foundation member of the Henry Doubleday Research Association of Australia, and left the Aboriginal Advancement movement in 1973 to be a goat farmer at East Kurrajong, NSW (till 1982). He wrote on ***Aborigines Today*** *in Earth Garden 22-3, our Australian Access issue, in 1978. Jack now lives in retirement at Canberra with his wife Jean.*

planet ... As far as we can judge, it is the beginning of a life and death struggle for creation on this earth."

What does it mean, then, in the face of a widespread attitude to dominate the earth based upon an unnatural will to power, to say that we believe (as people do) in God the Creator, and in this world as his creation? For, unless we reach a systematic ecological theology, we won't find a Land Ethic, which we so desperately need. Many Christians and scientists have been thinking about this question since Lynn White wrote his paper in 1967.

The trouble with White's argument was his misjudged handling of biblical scripture. I'm not saying that the Bible should be accepted quite literally. It needs to be read as it stands, but interpreted with imagination and intelligence. It is not really White's fault; as a reliable medieval historian he was reflecting a secularising view, assumed in the past four centuries to be a correct account of the creation story, that Man is the master of Nature. He contrasted the Roman pagan views of Nature ("in Antiquity every tree, every spring, every stream, every hill had its own *genius loci*, its guardian spirit") with the dogmatic notion, as he understood the story in the Bible, that "Man shares, in great measure, God's transcendence of nature."

Christianity, White continued, set up "a dualism of man and nature, and ... insisted that it is God's will that man exploit nature for his proper ends." This accounts for the present wilful sense of unlimited power and destruction, he thought, and for illustration, pointed to two significant ideas in *Genesis*, Man's ability to name the animals, "thus establishing his dominance over them," and his place of honour in Nature: "he is made in God's image."

Before we discuss his argument, there is another point. Why were Australian soils mismanaged last century? It is the great lesson of 'organic gardening', as we learned it since the 1940s, from the classic books of Eve Balfour, Rodale, Albert Howard, Bromfield and Lawrence D. Hills, that "we should put back in the soil much of the goodness that we took out, when tilling the earth" by means of composting. Early in our history, the first farmers lacked the knowledge and wisdom of this. They came to a continent of ancient rocks, arid climate and acid soils, and they were mostly city bred people. They exhausted the earth.

A book published in 1826, intended for migrants, written by a James Atkinson, described the poor state of agriculture in New South Wales. (This was quoted by H.F. White and C. Stanton Hicks in their standard book on soil management, *Life from the Soil*, 1953.)

> 'The settlers of this class have seldom
> any livestock, except perhaps a few pigs
> and poultry; no manure is therefore made
> upon the farm, and it is common practice
> to burn the straw and corn stalks; this, I
> am sorry to say, I have frequently seen
> upon farms where better things may be
> expected.'

(In 1953, White added a wry comment that things hadn't changed). Of the better type of settler, Atkinson was contemptuous:

> 'A most lamentable deficiency of
> agricultural knowledge and rural
> experience is observable; many (men)
> have been tradesmen, and officers in the
> Army and Navy; and I do not believe it is
> possible, at the present
> moment, to name ten individuals in the
> whole Colony who can properly be called
> farmers.'

Atkinson was possibly too censorious. Long before 1826, there had been farmers on the Hawkesbury riverflats. By 1846, however, Australian graziers felt strong commercial pressure to produce too much wool.

What happened was this. Back in Britain, wheat bounties had helped English farmers since 1815; but to release the country from widening social divisions between townsfolk and country landowners, the House of Commons in 1846 repealed the Corn Laws. This meant city folk could buy bread cheap. It didn't actually overthrow English agriculture at once; but, more and more, foodstuffs were produced commercially. The large population of industrial Britain forced an imperial economic demand, exploiting the American prairies, Argentine pampas and Australian plains to supply them with food and clothing.

The huge sheep runs of south-east Australia were overstocked. Whole forests were rung-bark. (It was thought that grass and trees competed for water, so trees had to go.) In the Queensland cattle country, there was a profligate waste of artesian waters, besides the outrageous shooting of Aborigines. A few squatters sold out to live in London, but more adventurous men moved out to Northern Territory or the Kimberleys. The urge to 'add land to land' finally ceased, with the Bank Crash of 1897. After the 1902-08 drought, many pastoral stations never regained their pristine soil.

This grim picture of 19th century rural Australia illustrates a lack of balance in husbandry. We had made ourselves the greatest sheep factory in the world, with a corresponding record for standard of excellence in commerce as much as in wool. But there was a cost. The strong reliance on free market forces, and the inducement to deal in big numbers of beasts and over-cropping, may have been good for competition, but they spelt erosion of all our soils. Since then, chemicals have kept soil as a neutral ground to absorb artificial fertilisers. Some EG readers gave 'super' away, in years past, saying it did their soil no good.

But why did farmers and graziers depend on secular and economic means alone for their husbandry? Why not replenish the soil for the future? As Roberts said, underlining White's theme, this outlook shows a scant respect: "Man is the master of Nature." Commercial aims were more important than minimising the damage to the ecology. We know now that if humanity relies on continual technological advances to forestall Malthusian limitations, the ecology can never rest, and indeed may break down — putting human survival at risk.

There's an interesting Australian debate on this very question. The philosopher John Passmore, of the A.N.U., in 1974 published a book, *Man's Responsibility for Nature: ecological problems and western traditions*, in which he concluded that false views of Man's place in Nature delayed our knowledge of the crisis. "Only an ethic recognising the primacy of human interest, " he wrote, "contains the potential for preserving the environment and human creative freedom." So Passmore plumped for human needs as the sole criterion.

In 1975, Val Routley wrote a criticism of the book in an Australian philosophical journal, in which she rejected Passmore's espousal of human chauvinism amd Western ethics. Routley replied that it doesn't follow that, if you reject the assumption that Man has dominion over Nature, that you must adopt the opposite view of pantheism. Or that Nature is sacred, and has rights independently of Man. Manipulation and interference would be unthinkable. She asked for a middle position, an environmental ethic not placing human interest uppermost.

Passmore's judgement echoes Lynn White's comment (1967) on the biblical creation story, that "no item in the physical creation had any purpose save to serve man's interests." But this is a mistake. In fact, Christian ethics never adopted this view. According to a Catholic theologian , Robert Faricy (1982), there were two popular and permissable Christian models for respecting Nature, in the Middle Ages: that of Saint Benedict (c. 480-550), to administer the earth by making it yield intensively, without however causing it to lose its fertility; and that of Saint Francis (1181-1226), of praise and contemplation. Both models, Faricy noted, are authentically and correctly Christian.

Benedict — "the father of Europe" he has been called — in c. 540, in Monte Cassino in Italy laid the foundation and rules for the great Western European monastic tradition. His rule on husbandry influenced such things as physical labour for monks, draining marshes, and cultivatiung soil with the mulch and muck practices, hydraulic power, and deforestation. It was the model for herbalists and gardeners. Many monasteries adopted this. The love of animals and natural things, as Francis conceived it, offered a vision of freedom.

These two Christian attitudes were complementary. There is no evidence for Dr. Roberts' suggestion, in EG50, that the concept of Man's unlimited power over Nature was respected in medieval Europe, nor did Saint Francis incur the wrath of the Pope (Innocent 111) with his new concept. We still sing his poem, *Praise of created things* in church (No. 3 in *An Australian Hymn Book*).

Ivan Illich, the Christian critic of modern society, has drawn attention (in *Shadow Work*, 1981) to a 12th century Christian scholar, Hugh of St. Victor. Hugh's general theory of science derived from the Garden of Eden story; and it reaches forward through eight centuries to the 'intermediate technology' of the late Fritz Schumacher, the simple experimental garden plots of Lawrence D. Hills, and to the policy of Earth Garden. Hugh set ecology as the *foundation* of his 'science by the people'. To quote Illich:

> 'Humans, through their own fault, are weakened and must survive in an environment they themselves have changed (Hugh said). Science, then, is the search for a remedy for this painful condition. Thus the primary emphasis is the attempt to relieve human weakness, not to control, dominate or conquer nature for the purposes of turning it into a pseudo-paradise.'

The pass-key to the workings of Nature, as Illich interprets Hugh, is the wise study of human artifacts, regional tools (part invention, and part imitation of Nature) and manual method of work. Isn't this just what Irene and Keith have said for 15 years?

Clearly, "Dominion over the earth" or modern agri-business was a late starter. It began with windmills in the 13th century, with Francis Bacon for its advocate in the 1580s. How did Lynn White get the wrong idea from reading the Bible, written c.3,000 years ago?

Christianity is founded upon Judiasm, and it is indelibly marked with Jewish wisdom and thought. White's theory of "Christian arrogance" in regard to Nature derived, so he thought, in the creation story, with the dogmas "human dominion over the earth" and "image of God". He simply identified the "image" with the "dominion". But a German theologian, O.H. Steck (1978) explained it differently. God's injunction to humans, male and female, in *Genesis* 1:27-30, is a *dietary* command. Humans and animals alike are to live from the fruits of the earth, as vegetarian gardeners using the composting tradition. Exploitation of Nature is not taught in the Bible itself. Harmony was meant to abide at Eden, where the humans "till and keep the earth". The rule of humans over animals is a rule of peace, for both are to live from fruits of the earth.

ELEVENTH COMMANDMENT

Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation and protect thy hills from overgrazing by thy herds, so that thy descendants may have abundance forever.

If any shall fail in the stewardship of the land his fruitful fields shall become sterile stony ground and wasting gullies and his descendants shall decrease and live in poverty or be destroyed off the face of the earth.

WALTER LOWDERMILK, *An Eleventh Commandment*, Soil Stewardship Sunday, May 15, 1955 (Published by National Association of Soil Conservation Districts, USDA), included in *Soul Conservation* (Dr. Brian Roberts, 1986).

Jurgen Moltmann (1985) argues that the whole point of the story of creation is not Man, but the Sabbath. "And on the seventh day, God rested ... " In Jewish law, men did not work the fields on the seventh day, and in the seventh year the land lay fallow. By the 50th year (7 x 7 + 1 years), the land was to return to its rightful owner. In his recent book *God in Creation*, Moltmann erects a joyful ecological doctrine of present day creation: the Jewish Sabbath (of peace; rest) is conjoined with Christian eschatology (of future hope) to have a harmony of God, Man and Nature. But how does this face continual consumption in today's society?

Lynn White could have read many creation psalms, where men, women, animals and seas, mountains and so on are asked to praise the Lord God. This presumes they are no mere slaves of Man, but creatures of God, just as he is. A dramatic passage in the *Book of Job*, too long to quote (Chap. 38.1 - 42.6), has the voice of God speaking mysteriously out of a whirlwind to Job, making such claims to cleverness in the creation that Job looks up to God, and Nature too, in awe and humility.

A further influence of moderation in husbandry, was the scriptual tradition of social generosity to the poor. This moderated the greed of farmers. In responding to the ecological crisis, in *Enough Is Enough* (1975), John V. Taylor, former Bishop of Winchester, explains this Jewish tradition against 'grasping excess', which carried over into Christian thought. A law of limited cropping said that the vines were enough, land was not to be exploited, there was to be no planting between the lines. Vineyards and olive trees should be pruned every fallow year. The crop growing from last year's fallen grain, and the grapes on unpruned vines, were to be food for the poor. No farmer should glean to the edge of the field, but leave some for "the alien, the orphan and the widow."

It was Francis Bacon who articulated the teaching that "Man is master of Nature". At this time, science and religion parted, and theology was reduced from faith in God's creatures to a personal belief in the Creator and the creation. (Mutual irrelevance was a result of this demarcation, as well as independence, for each discipline). Bacon used an image of slavery. Mother Nature with her children is to be subjected to the man, not the human being: a sexist image (according to Rosemary Ruether, 1975).

Later, in the 17th century, René Descartes proposed that the aim of the exact sciences was to make men masters and possessors of Nature. Descartes set up a complete duality of Man's experience, as soul/body/, mind/matter, and so on, including the dualism "man versus nature". Soon the spiritual part of Descartes' system was dropped as irrelevant, as indeed it was in the mechanical philosophy of that time. Both Nature and history were regarded henceforth as profane.

Now in the 20th century, the universe looks less like machinery, more like a life. To control the present crisis, therefore, modern scientists and theologians – as Dr. Roberts suggested – are looking for a valid Christian theology for God and Nature, with Man and the other creatures related to both. This will need to relate to Einstein and his physics, as Newton is dead; and Darwin put 'finish' to the idea of scientific determinism.

In both Jewish and Christian traditions, the main affirmation is that the God who saves is the God who creates. All creation, totally dependent on the Creator, is real and good. That's basic!

Within this frame, two different creation doctrines emerged down the centuries – the first, God existing outside Nature, creates alone and freely from nothing, like a potter with clay, or a cosmic mechanic. The second implies a God with a creative, immanent presence within the continuing world, active rather than passive. The first doctrine demanded empirical science, since the world need not be the way it is; it fitted like a glove to Newton's mechanical universe and Hume's scepticism. Evolution threw over the idea of a static world. By describing a changing, dynamic Nature and an open ended universe, the *second* doctrine of God is very helpful for our times.

Some scientists and theologians had worked together as partners, but some wrote books alone. The World Council of Churches held many discussions, for the diminished ecology undermined the traditional Christian concern about justice for the poor. On balance, it may fairly be said that the scientists have helped to reappraise the place of God as an intelligence in the known universe, but tend to look at Man and his religions in secular, not spiritual, ways. And the European theologians found many fresh trails in the quest, but have yet to connect with scientific, biological, doctrines.

Adam and Eve from an early Romanian painting on glass.

So there is no need for pantheism, Dr. Roberts! They're working on it. I dare say that ordinary lay people have some thinking to do, too. We live in the same planet together. A new question now demands an answer: Granted that life on earth arose through the evolutionary processes, why should such processes occur in the first place?

The suggestion Dr. Roberts put in his booklet *Soul Conservation*, which was a direct appeal to churchmen for help and some action, was for a doctrine of Stewardship. The idea is that we hold the land in a form of trust, and cannot do what we like with it. But this still does not overcome the evils of modern agricultural and mining technology, because large scale economics seem to be outside the treaty concept. A theologian would, I think, object that even Stewardship suggests some form of ownership and independence – today's crisis demands stronger controls than this.

As a postscript, I append a scientist's comment, which he wrote in his autobiography. Freeman J. Dyson remarked, "The more I examine the universe and study the details of its architecture, the more evidence I find that the universe in some sense must have known we were coming." It has been suggested that this is the only sort of Earth where life may happen.

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THE ATCV — WORTHY WORK

Field teams and volunteer members of the Australian Trust for Conservation Volunteers (ATCV) planted a total of 139,863 trees during the 1985-86 year.

As well, ATCV people built many kilometres of walking tracks and fences, cleared weeds and revegetated eroded and burnt land in National Parks and on private farmland. They have made a marvellous contributiuon to regreening our Australian environment.

In only four years since ATCV was formed (due largely to the vision and hard work of its executive director Tim Cox), it has established itself in most parts of Victoria and expanded into NSW, South Australia and Western Australia. The organisation has received funding from Government and private companies which helped to provide long term work for many otherwise unemployed young people.

There is no more worthy work than work for a good cause that is done willingly and for no payment. This kind of integrity is shown by ATCV volunteers, who actually pay a small amount ofr their upkeep while on the job.

ATCV membership is $10.00 annually, $15.00 for a family or group and $3.00 for a non voting associate. Write to the addresses below (with SAE) to find out more about the Trust and upcoming tasks.

Australian Trust for Conservation Volunteers

Australian HQ: 13 Ascot Street North (PO Box 423), Ballarat, Victoria 3350.

Victorian Regional Offices: Albury-Wodonga, Felltimber Creek Rd (PO Box 17), Wodonga 3690.

Bendigo, 96 Mollison Street (PO Box 879), Bendigo 3550.

Gippsland, 15 McInnes Street (PO Box 226), Churchill 3842.

Melbourne, C/- NRCL, 593 Springvale Road (PO Box 105), Springvale 3171.

Warrnambool, 68 Keppler Street (PO Box 799), Warrnambool 3280.

State Offices: NSW, PO Box Q397, Queen Victoria Building PO, Sydney 2000.

W.A. , 'Winter House', Johanna Street, North Fremantle (PO Box 100, Melville 6156).

NO TREE TAX?

We do not add a levy for tree tax to the price of our magazine. We think there are enough taxes to worry about. The paper stock we have always used to print Earth Garden is *Kympress* or*Kymmene* (an uncoated paper, one step up from newsprint). This is a product of forests planted specifically for paper making in Finland (where it has kept generations of foresters employed) — so we don't use Australian trees.

As it happens, most of the Earth Garden books published by Thomas Nelson have been printed in Singapore on recycled paper. We have paid our dues for the paper we use by alerting people to the degredation of farmland and destruction of the Australian bush and by encouraging sustainable agriculture and reafforestation.

But you can still do us a favour. **Plant a tree for EG!** — Keith & Irene.

Back to the trees

I had been long in meadows,
And the trees took hold of me,
And the still towns in the beech-woods,
Where men were meant to be.
G.K. CHESTERTON

By John J. Alderson

The soil is that portion of the earth's surface which sustains life, commonly referred to as 'topsoil'.

The soil of the tropical rainforests is based on a sterile clay or gravel which, due to the heavy rains, is leached of all nutriment. The soil of these forests is wholly a product of the rainforest itself: remove the trees and in a few years there is only the sterile underlying clay or gravel. This simplified structure is, in exaggeration, the structure of all soils.

Ordinary soils, though, are not usually so leached, and deeper rooted plants can utilise a certain depth of the subsoil. But, by and large, every scrap of topsoil on this planet has been created by trees and it is unlikely that any other soil making mechanism will ever be produced that will supplant a tree.

In any case, were such a soil making factory possible, it would take superb company, a most excellent wine and a surpassing loaf of bread to make one dally beneath its eaves rather than under Omar Khayyam's 'shady bough'.

It is also unlikely that even if we were able to create some new Garden of Eden (it was actually a park as Moffat more correctly translates it), that it would be always self-sustaining if we were to continually remove its produce from it and not replace that loss. Trees make soil, but only the consumption of its products and the return of the waste materials to the soil can allow that area to continually feed and clothe its children.

If we are to continue to live on this planet in anything like our present population density, then we must return to the land in a real and integrated way. We are in more danger of dying out as a species because we have ceased to be of any value to the ecology than for any other reason. Nature has no passengers. We have to return to the trees.

To still any murmurs of discontent at this mention of a return to the trees let me say at the outset that civilisation and all we hold to be worthwhile in the material sense, and partly in other senses, began in the oak forests which stretch across the northern hemisphere roughly following the 40 inch rainfall belt through spurs of the oak forests and down into much lesser rainfall areas. From this area derived most of our fruits and berries, most of our herbs, many if not most of our vegetables, most of our cereals, many if not most of our forage plants, most of our domesticated birds and animals, most of our domesticated insects, most of our tame 'farmed' fish.

In these forests men first wore clothes, first made leather and wove cloth. Here they first built in wood and then stone, here they first made bronze, iron and glass. Here they first domesticated animals, practised agriculture and devised the first irrigation systems. Our oldest poetry comes from this area. Here civilisation began, and have no fear, can continue.

And why was all this? Because the abundance of food trees gave men and women the time to better themselves.

Every gardener knows that the 2 or 3 cm of soil to be found in the ordinary paddock speedily becomes five or six times as deep in a garden. This is a cumulative effect brought about by the gardener ... and believe me, gardeners are valuable parts of the equation. Thus God put man in Eden to dress it. That soil consists of inert particles of clay or silica which form the body of the soil and hold the moisture, a mixture of various minerals, much organic stuff and myriads of invisible wogs which digest the minerals and and organic matter and turn it into the sort of food that plants can use. These plants in turn produce tissues we can eat and whose wastes we should return to the soil to complete the cycle. So, in a well ordered garden the soil gets deeper and deeper and richer and richer and produces more and more.

The soil is, for all intents and purposes, a living organism. Starve it and it gets thin, feed it and it keeps healthy and grows fat. Only sheer bad management, only wilful robbery of the soil can exhaust it.

The soil contains large numbers of micro-organisms of a surprising number of species. There is safety in numbers. It is fairly certain that every time a new species of plant is introduced into the system a number of new species of micro-organisms comes with it, or at least flourish in its shade, and more visibly each new plant attracts its share of moths, butterflies and other insects, spiders and fungi and, happily at times, of birds. Most of us like this, but there is a very good reason to attract such creatures. Obviously many are predators, which keep a check on other species so that they don't get out of hand. For this reason it is a good practice to have as many species as possible growing in the garden. There is yet another reason.

We cannot get a completely closed cycle. Seeds and pollen blow away from our gardens. Bees and moths take away nectar, etc. Birds wander away from the garden for reasons of their own while others visit, usually to eat, but the amount of manure these birds deposit on the garden which had its origin outside is considerable. It's worthwhile attracting them rather than buying 'fossil' bird dung at the supermarket. Pollen also blows into the garden: think of the film of creamy yellow pollen from one pine tree, covering half an acre ... a layer of highly nitrogenous fertiliser.

So we have our garden or our farm, a wild mixture of trees, shrubs, herbs, climbers, root-plants and a fluttering mass of insects and birds, and underneath a thriving mass of worms, grubs and micro-organisms that you need a microscope to see. If you don't take the produce away, the cycle will go on virtually forever.

Of course if you water the garden you'll increase the output several times. Just as obviously as growing your own garden you need your own dam and water supply. Here there are really possibilities for expansion. If you put fish in the dam you increase the results of watering fourfold, and if you put ducks on the water you can double the number of your fish. As in the garden, the more different species you can cram into, onto and around the dam , the better and more fruitful it will be. It is said, and said justly, that if one half of a property is devoted to storing water the resultant fertility of the rest more than makes up the difference.

In a way the yabbie is at the bottom of the food chain. They are especially fond of kangaroo tail, but will eat grass or sawdust, while horse manure delights them. They produce 700-1000 young per year. Most are eaten by fish or birds and some by human beings. Frogs also produce large quantities of young and the tadpoles of some species can be cooked and eaten like whitebait. Some frogs are edible, but they are also food for fish.

Mussels clear the water. They filter from the water the micro-organisms on which they live. When in a good situation they reproduce happily and are again a fish food which humans can eat. Many fish, like catfish, are vegetarian (that is they eat vegetation), though of course fish eat everything from duck manure to acorns, from mulberries to mice. So berries and nut trees can line your banks. But don't under any circumstances introduce redfin into the dam or they'll kill everything and you'll end up with thousands of stunted redfin unfit for anything but feeding to the chooks or burying in the garden. Water plants should be grown in plenty, wild rice, even cumbungi, watercress, water chestnut and duckweed. Bulrush is pretty useless. If you take a torch and look at the water at night the water should be swarming with life.

Water-hen, ducks, geese, swan, all have a place on the dam. So will wagtails, swallows and wrens, though they're a bit small to eat. All the bigger birds eat fish and yabbies, if they can catch them, and lots of vegetation and shelter in the form of hollow logs and old tyres give the fish a fair edge. A drum net is a good way to get fish for the table, though a flat net stretched over a bicycle rim and baited with meat or fruit (I've used quince quite successfully) is the best for yabbies. I find it best to throw back the very biggest for breeding purposes as well as the undersized ones and all females with eggs.

It is as pointless having a dam filled with fish or covered with ducks you don't eat as it is having a vegetable garden filled with cabbages you don't eat. All this is part of the ecology you are setting up and it is pointless and damaging to the cycle not to harvest the dam and the garden and eat the produce and return the wastes.

The same principle applies to farming or horticulture on the larger scale. You have to pay your rates or be sold up, so you must sell something. This leads to situations where there is one main crop to a paddock, be it spuds or apricots or wool. As much as possible, the main crop should be modified in every possible way. With say wool, a varied pasture of a wide variety of legumes, grasses, shrubs and trees can give variety and ensure a healthy soil and healthy sheep. Fruit can be interplanted with a wide variety of crops. Trees may be planted in grapevine rows and allowed to grow above the vines ... avocadoes have been used for this purpose. Leguminous trees are helpful, not only in the rows but around the borders of the paddock. If things like spuds are planted *en masse*, they should only be planted as part of a wide rotation and again the paddock should be hedged with suitable trees.

Wheat is the great destroyer of soils, probably the greatest curse of civilisation, and indeed old civilisations are usually marked by the wheat-caused deserts around them. But even wheat can be grown in moderation with good crop rotation and an interplanting of trees and the use of foraging animals. Wheat however is essential for the sustenance of city populations (or at least *they* think so) and farmers through the ages have been forced to grow wheat to sustain the cities. It is time we rebelled and saved our soils.

I have a dream of seven-eighths of our country going back to trees, and the remaining eighth farmed intensively and lovingly and feeding us all in comfort. We may not have an export trade and people may not be able to buy overseas cars and TV programmes, but we could well be the better for that.

SOYMILK AND NUTMILK

By Dora Madgen

I make my own herb teas and soymilk and nutmilk.

The secret of making soymilk is to first soak soybeans for 24 hours, best from one morning to the next.

First, pour boiling water over the soybeans. Then take 1 cup of soybeans (with water poured off) and place in a blender. Pour 1 pint of boiling water over them and select the button for 'chop fine' , or it might break the blender (mine has seven buttons).

Then aerate and powder for a few minutes and pour through a fine sieve while still hot. Sweeten if you like with a touch of honey, karo syrup or maple sugar (not cane sugar which hardens food). Simmer the soymilk t for two minutes before bottling and it will keep as long as cow's milk.

Nutmilk is made in the same way. A few almonds with the skins on when soaked and water poured off is palatable. Use a few almonds, coconut, 1 desertspoon of raw peanut butter, a little oatmeal (from the top of cereal) and a little millet meal (good for the eyes) if you wish. Blend and strain.

You can use the residue, with a little of the milk, for soups with vegetables, potato and parsley. Or make patties by adding Marmite or Vegemite and some Torula yeast on a dessertspoon, plus a litttle vegetable salt, a mild curry or some cayenne pepper (just enough to cover your small thumbnail).

I believe all people in cold climates in Australian should grow maple trees for sugar, so they can leave cane sugar alone.

Sola 1: A super simple solar electric system

(GENTEEL FRUGALITY, Part 3)

By Dr. Patrick f. Howden

On this mini Utopia island we can see little percentage in overworking ... sloth is vital for serenity and harmony. Planting two fruit trees each week, for instance, builds up to a 104 tree orchard in one year. But now our caravan has graduated to its first eviction order, though luckily the $10,000 kit set home plans are in.

Curiously, irreducibly simple things are harder to invent, often requiring three approaches to every problem and that's what we wanted, as Energy Missionaries — a super simple solar electric system that can be assembled in minutes with few tools or skills.

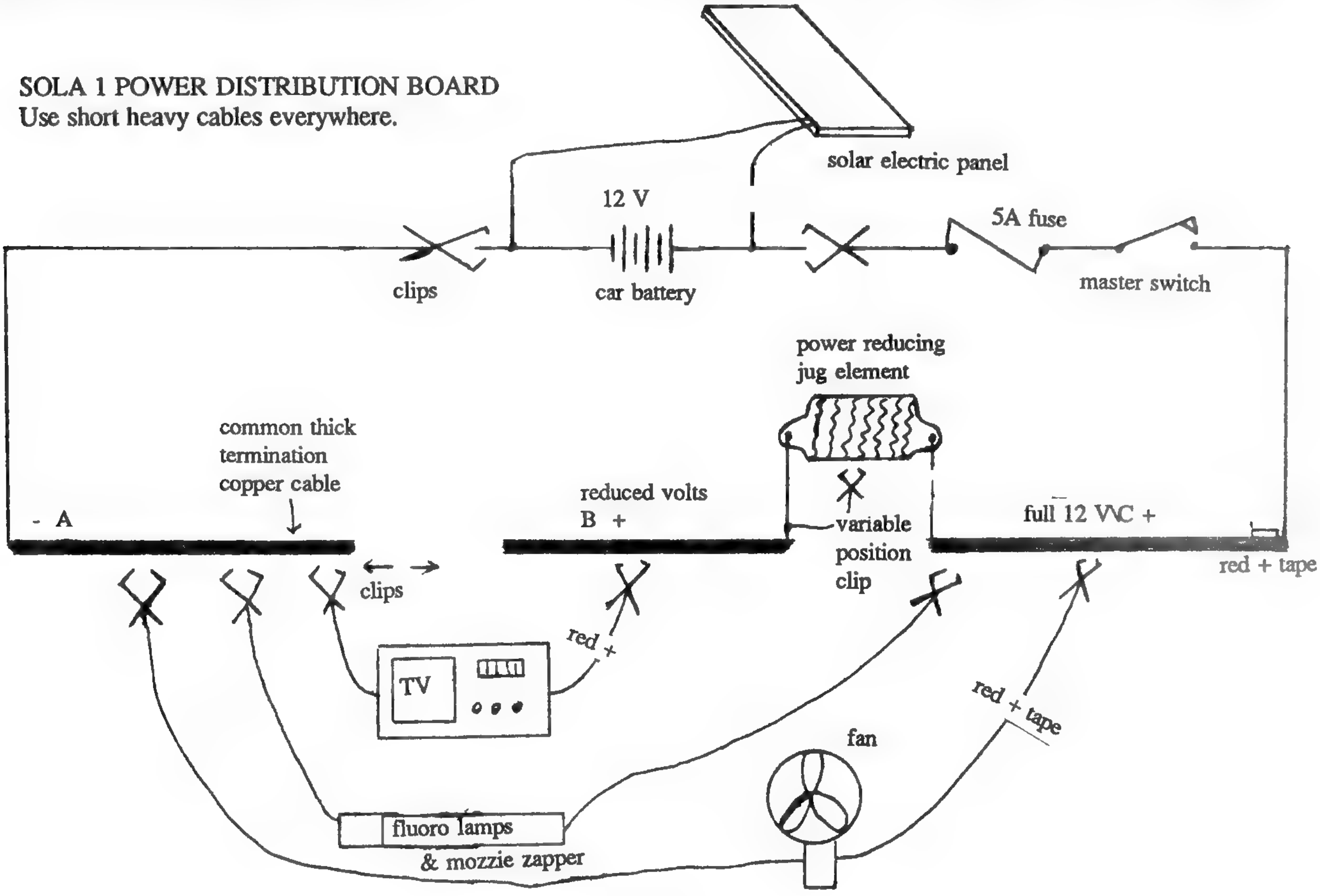
A complete solar system depends upon appliances. Many Alternative Technology (AT) design articles are too vague to be useful. We want to help by becoming completely product specific. It's very easy to come up in the world of 240 V appliances, but much harder to climb down to using all 12 V units which must be so carefully selected or designed for maximum power economy. Thus we suggest you sell or barter all your 240 V gadgets for 12 V goodies as described later.

Forget about inverters. They cost the earth, fail often and aren't too effective in providing power to overpowered devices — 24 V would also do nothing special for us in the system described. So far only a blender and heavy power tools demand a small motor generator set.

It may not be everyone's tinny, but there's something immensely satisfying about purchasing say, the first fan. First we look up offbeat suppliers' catalogues (caravan, truck, boat, *Choice* magazine), taking in all the amps data, learning what performance means. Then visit suppliers, preferably wholesale, armed with a *digital* multimeter (up to 10 amps DC) and a 12 V car battery in order to check possible wild claims under a shop test.

Soon you will have tried all known and some unknown specifications, the required inputs and outputs, plus guarantees. At home, fan mounting and electrical connection decisions will be taken, including the need to slow fan speeds with a 3 position switch. Mastering these typical steps and simple skills will soon make you a knowledgeable Home Engineer.

But why solar energy and not other sources? Wind proved capricious and lots costlier per watt (W). Water ? No rivers on this island. **Tidal fall** was too small. **Methane, wood heated steam, woodgas** or



SOLA 1 POWER DISTRIBUTION BOARD

Use short heavy cables everywhere.

alcohol were too labour intensive.

Solar electric power at $7.50/W was the logical choice. Soon prices will plunge further. There are no moving parts and solar's ability to charge in a gale can't be ignored. Perhaps only homemade windmills could prove cheaper per W (see catalogues). There's too much fat in AT products, so be prepared to bargain heavily. I got 25% discount on the solar panel.

Battery cost = zero. That's right! Of course, if you can't afford a solar panel and have to drive to work daily, then (as we did for months), park the waggon on a hill and run a cable to your appliances. Without heavy, costly cables, we find we need three 12 V car batteries — all from the dump for free!

Battery #1 is carted to the swamp water pump each week, or to any tool use location.

Battery #2 is used indoors for the vacuum cleaner, computer, tools or for similar mobile uses, until it needs solar panel charging.

Battery # 3 is under charge whilst similtaneously connected to the household power distribution board.

When a battery quits, simply get another freebie, though even batteries with a dead cell are usable because most appliances run on 10 V or less — but try to short out the dead cell with a metal strap (dig away the top plastic). Good cells can thus be connected from two old batteries to make 12 V.

Taking into account all that Peter Pedals has said about batteries in *Earth Garden*, we have a little to add. Battery condition, charge and capacity is *not* indicated by a *hydrometer* (we have a little three ball cheapie), because most cell material could be eaten up and you'd never know it. Of course, what remains *is* fully charged for a few minutes use. Only *good* battery condition is indicated by a hydrometer. Through usage you will soon know if the cells stand a full charge OK. If you don't have distilled water when needed, use rain collected in a clean bucket. If you don't have a trolley try to choose a battery light enough for the missus to cart weekly to the swamp (oops!).

Solar panel charging current decreases as battery voltage increases, thus we don't need a charging regulator. At most we find a few gentle bubbles emitted, certainly no heating under charge. Always give charging priority to the battery having the lowest hydrometer reading, not only to protect the cells, but because the solar panels then put out more amp hours.

Caution: Stick a big strip of red tape next to each + terminal and wrap one around each appliance + wire, terminal or clip.

Keep a wire brush handy to scrub corroded terminals. Grease terminals and connectors. We have mounted a 0-10 amp meter right on the battery connector to measure solar charging current, which seldom exceeds 3 amps, usually 2.5 amps.

Solarex X100 GT panel. This 42 W polycrystalline unit we purchased from Bob McKnight Trading (Brisbane). Usual price is about $10/W = $400. The price is bound to drop soon according to the U.S. Department of Energy. Shop around to the wholesalers, bargain heavily and watch the tax angle. Especially analyse the panel data and graphs to ascertain whether you are getting the right power. At flat battery voltage, panel current is large and vice versa. Somewhere in between, the product battery volts (V) x solar panel amps (A) derived from the graph should equal the quoted panel Watts (W) — in our case 42 W.

Another interesting fact to check is that solar cells should give a maximum of 100 W/square metre panel area into a battery, the same as a good wind generator at 30 km/H windspeed. With discount, one family dole cheque will buy 20 or more years of electric power, equal to the cost of connecting mains to a new property pole! Don't get ripped off several times per W too much. Most folk pay $1.07 each day for electricity. That represents a $6.25 month payoff period.

Some more useful panel facts. As delivered, the unit has a diode to prevent night back current flow. The voltage drop across this diode is always about .75 V. I therefore put a day/night switch across this diode to save that power. But don't worry if you forget to open the switch at night, as the dark current is only .018 amp from the battery. Open circuit voltage without the diode is 17.86 V and short circuit current 3.1 amps, providing the panel is directly facing bright sunshine.

We must emphasise the use of very **short, thick cables**. Our 2 metre wire (4 m in total), terminals and panel screw connector still drops .53 V, or a massive 1.28V, including the diode. We're working to improve this. Charging during dull days can be 5-1 amps.

Currently our panel sits tilted on the water tank, which is far from perfect, though the need for air cooling and access for dust cleaning , or removal during a storm, is satisfied. It's nice if the panel is portable enough to take elsewhere, for example, to charge the truck battery.

Panel rotating and tracking. We get far more power than we need now by a simply fixed panel installation, but not so later on when we may have to track the sun, or manually index the panel three times daily (see sketches).

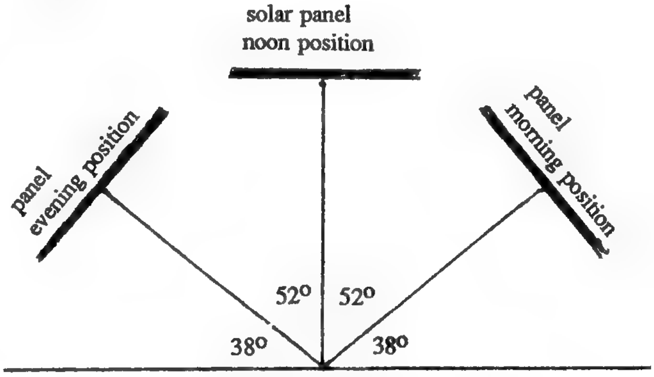
Note that if L = your latitude (27.7 deg. here), then in order to face the sun in midwinter, horizontal panel angle + L + 23.47 deg. (= 51.17 for us). Equivalent midsummer angle + L - 23.47 deg. (= 4.23 deg. for us).

You will have noticed that in summer, the sun rises and sets slightly south of east and west. A panel mount, besides being hurricane proof, must account for such motion. Well, with a small monthly tilt adjustment, this tracking motion can be achieved on one axis as shown in a proposed frame drawing. Accurate tracking is not needed. A tiny motor, a falling indexed weight, or a float on a cylinder of water leaking out a small hole can perform the rotating function, though we will settle for a manual system here.

To avoid long term corrosion, all panel frames or bolts must be aluminium or stainless.

Appliance list. Our list of surprisingly cheap 12 V, low current appliances from diverse sources (sadly made in Asia), include: black & white TV, cassette-radio (FM/AM), 2

THREE POSITIONAL CHANGES FOR SOLAR PANEL



1. Daily/manual. Assumes first and last effective solar charging is from 12° from horizontal.

x 8 W fluorescents, 3 speed truck fan, mozzie zapper, shaver, heavy drill and attachments (jig, circular saw and sander), 30 W soldering iron, vacuum cleaner, submersible (bilge) well pump, *Sharp* PC 1500 computer with RS232 interface and *Brother* HR5 (full A4) printer.

All items operating on less than 12 V (computer system, shaver, second radio-cassette) need my special patentable electonic invention, the **Voltap**, whose components cost only $2.05. Its circuit and multi-appliance use will be shown in the next article. 1 amp or more can be drawn from Voltap by several appliances at different voltages, all similtaneously.

Power distribution board. Sounds like something from a battleship, yet it couldn't be simpler, being a few bits on a masonite plank. We call it **SOLA 1** (see schematic). It consists of a 3 amp fuse mounted in a junk car fuse holder, with an old switch (= all off), one jug element and 3 x 10 cm lengths of very thick bare copper cable (buss) to act as a hitching post for all the appliance crocodile clips.

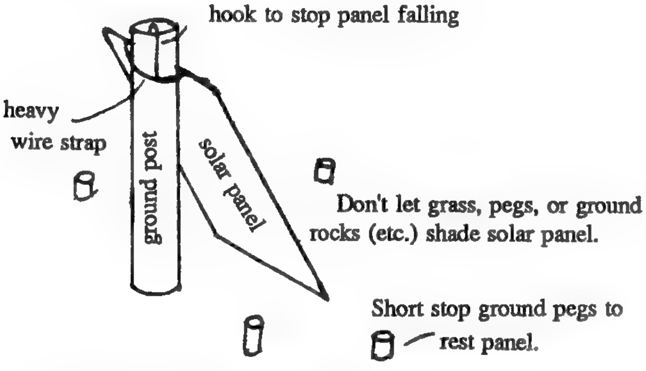
We could have chosen polarised plugs or cigar lighter sockets, but what could be a cheaper, more portable connector (to allow current measurement) or versatile switch than a 5-10¢ clip? You can take tools, lights, etc. anywhere where there's a battery! To turn off a circuit, remove the + clip from the buss and clip it to the top of the board out of the way (true Back Yard sophisticated Tech). Grease outdoor clips all over. About 3 m heavy wire connects SOLA 1 to the battery under charge. We do have a few convenience switches, for example on the bed lamp and the fan. Clipped systems are indispensible on our numerous solar seminars away from home.

If you want full 12 V on any appliance, clip between A- & C+. But lamps and TV will work at lower voltages to save power, at least until the TV loses 'hold'. So clip such items between A- & B+, setting the jug element clip as far from the right as you need. Iamgine, a lamp dimmer! Note that if power to a unit is thus reduced to half, the battery power reduces to only square root (.5).

Ideally, a chopper voltage divider is required to save more power — any cheap offers from electronicers out there?

More next time. Feel free to write (SAE please), or better still, come visit a while and enjoy many other fiendish Alt Tech and self sufficiency schemes. Get a ferry at Redland Bay and bring a sleeping bag and picnic. With our cheapo kit house finally completed, we are in a far better position to welcome you for a tiny 'doughnation'.

* Cheers, Pat & Munni Howden, Back Yard Tech Enterprises (BYTE), Con Street, Macleay Island, Qld. 4165.


hook to stop panel falling
heavy wire strap
ground post
solar panel
Don't let grass, pegs, or ground rocks (etc.) shade solar panel.
Short stop ground pegs to rest panel.

2. Alternative manual rotator (cumbersome but cheap).

SOLAR ELECTRICITY

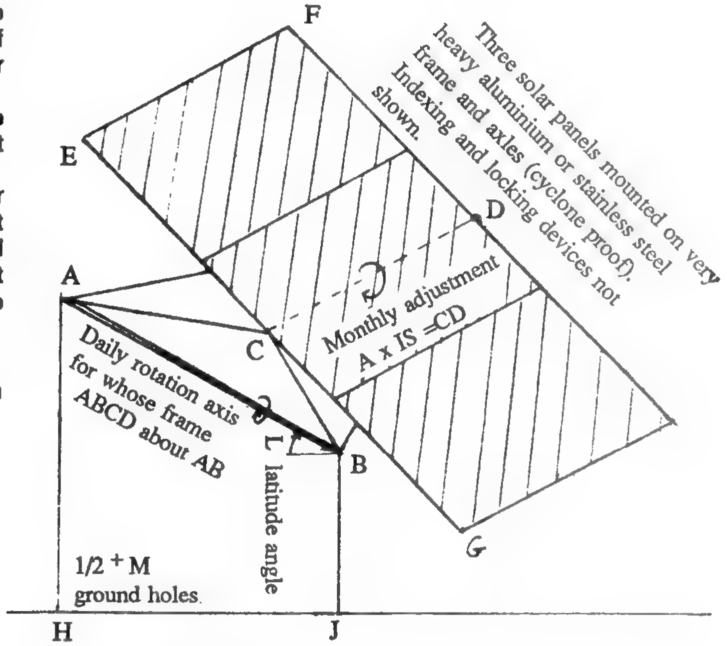
SOLAR CHARGE
FREE ELECTRICITY

- 12 volt solar panels - 5 year guarantee.
- Inverters 12 volt - 110 volt DC. Input to 240 volts AC.
- Large range low voltage lights.
- Gas/Electric fridges - 8 cu.ft. 10 cu.ft.
- 12 volt fridges.
- Pumps, circulators, pressure 12 volt.
- Deep cycle low maintenance, long life batteries.
- Battery chargers, regulators, mounting frames.
- 9 year's experience in Solar Electrics.
- Open 9 - 5 weekdays, Saturdays 9 - 12.

Call or write to:

SOLAR CHARGE P/L
Shop 122 A Martin Street
Gardenvale 3185 Tel: (03) 596 1974

Experts in Solar power for remote houses


F
E
D
A
C
B
G
H
J
Three solar panels mounted on very heavy aluminium or stainless steel frame and axles (cyclone proof). Indexing and locking devices not shown.
Monthly adjustment A x IS =CD
Daily rotation axis for whose frame ABCD about AB
L latitude angle
1/2 + M ground holes

HJ = 50 cm
EF = 97 cm
EG = 140 cm
BJ = short as possible, so winter morning position won't allow panel to touch ground.
AH = BJ + 50/TAN L.

3. Author's proposed precision^3 solar panel rotator.

earth people write

Dear Earth Garden,

This is a sad farwell letter to Irene and Keith. You have helped so many people on the road to health & happiness. As one of your earliest contributors, I am glad to have been associated with your educational work. Over the years dozens of people have written because of my articles and even recognised me in the street because of my pictures in Earth Garden.

People who want to learn and work for keep will always be welcome here provided they are vegetarian and do not smoke. Prior confirmation is required from me and sorry, no children.

I wish Keith and Irene the best for their new ventures and success to all you organic gardeners. Organic gardening is hard work but be assured it is worth all the trouble to have fresh, uncontaminated fruit and vegetables.

Marjorie Spear, Harmony Farm, Box 112, Kuranda, Qld. 4872.

Dear EG Readers,

I've settled down here at Cape York and started my garden. Could anyone tell me where I can get hold of **Liklik Buk**? It's published in Papua New Guinea and it's all about tropical agriculture, etc. Also, where can I get some winged bean seeds, the climbing variety?

Glen Pryce, Portland Roads, via Lockhart River, Qld. 4871.

Dear Glen — Liklik Buk can be obtained from **Liklik Buk Information Centre**, PNG University of Technology, Private Mail Bag, Lae, Papua New Guinea. We suggest you send an international money order to ask the price and cost of mailing the book to Australia. **Phoenix Seeds**, PO Box 9, Stanley, Tasmania 7331, have winged bean seeds. Their catalogue of non hybrid seeds is free and worth having — Irene & Keith.

Dear Keith & Irene,

I am endeavouring to use herbs both medicinally in the home and for companion planting.

Can any of the Earth Garden readers advise me on the benefits of the herb Feverfew.

Yours sincerely, Sharron Arnold, 3 Jessica Place, Mt. Colah, NSW 2079.

Dear Sharron — We presume that by Feverfew you mean *Chrysanthemum parthenium* , often sold as Pyrethrum (really *C. cinerariaefolium*). It is an annual with dark green foliage and white daisy like flowers resembling chamomile. Feverfew has a strong, sour odour (a bit like Tansy) and is disliked by bees. The dried flowers were once used as a tea to soothe fevers. This is a good companion for strawberries. **— Keith & Irene.**

Dear Sir,

I am writing to you to see if you or your readers can help me and my handicapped son. On a lake cruise on Wallis Lake, Foster, we passed a big old house up on a hill which we were told needs no power and has 40 acres of unspoilt land on an island, Wallis Island. It was believed to be owned by an 'alternative lifestyle' group, but that's all I could find out.

I would dearly love to be able to take my son somewhere like this and pay our way if someone could tell us where to apply. My son is not badly handicapped, but he does get embarrassed quickly and it seemed an ideal spot. Apparently everyone helps with the chores and we could do that.

Hope you can assist us, Francis Baker, 21 Ada Street, Oatley, NSW 2223.

Dear Keith and Irene,

I was very disappointed to read of your decision to give the job away because after 15 years you feel a change is needed. In my view, a lot of absolute nonsense.

I'm over twice your age and have battled for 40 years to win out on the Catchment Philosophy and multi-disciplinary coordination as now operating in the Murray-Darling Ministerial Council.

Yet after only 15 years you propose to chuck your good earth beliefs just when we need somebody to carry the banner and push the concept that what's good for the whole of the Murray-Darling Catchment is equally good for the smallest part of a region covering one-seventh of Australia.

We urgently need to have the basic message of the inter-relationship of everything with life understood and applied by the smallest landholder incorporated into your good earth concept. Indeed I suggest that such an understanding offers you a fresh basis of approach — especially since the third basic principle of the Murray-Darling Ministerial Council approach is the maximum possible involvement of the local community in the decisions and implementation of the programs.

Not only in the Murray-Darling Drainage Division No. 1V, but in the other 11 drainage divisions of Australia, we need the group Catchment cooperative approach for the sustainable development of our National Conservation Strategy.

Yours sincerely, Ernest 'Watershed' Jackson, Albury., NSW

Dear Ernest — Thank you for your concern. As you'll see elsewhere in this issue, we have put the future of Earth Garden into good hands. We are sure that Alan and Camille share our views about the problems of land degredation and the correct strategies for solutions — Keith & Irene.

[Mr. Jackson is the author of *Replenish the Earth* , which documents the Catchment Philosophy. Send SAE for details to 485 George Street, Albury, NSW 2640.]

Dear Keith & Irene,

After reading the article on **Home Schooling** by Mrs. Cheryl Dryden (Dip. N.S.T.C.) in Earth Garden 51, I feel a certain amount of disquiet and sadness. Why does Mrs. Dryden brandish her qualifications after her name if she believes that formal education at a school is irrelevant, or is such formal education only irrelevant for her daughters?

The choice Mrs. Dryden offers her children; that they can stay home or go to school, isn't really a reasonable choice for a child to make — what percentage of children would stay home from school given half a chance?

Mrs. Dryden seems to be denying her children the same opportunities she had herself, i.e. to gain a qualification through formal education and then make an informal decision as to your future directions in life. Is Mrs. Dryden really liberating her children from the traumas of schooling or is she just making them the victims of her own prejudices?

Who knows what talents lie within a particular child? I will be sending my children to school because they can be exposed to so many exciting prospects for learning. My children may choose to leave school at 16, or to become farriers, technicians, bartenders, accountants, musicians, athletes, artists, farmers, etc., etc. Hopefully, they will make the choice after being exposed to classes in which they find special stimulation. I have no special talents in any of the above occupations and therefore would not be qualified to teach these things in a home setting.

The socialisation of children at play in a group every day is extremely important. It is sad to see children denied this opportunity. I am sure there are many children in remote areas who would gladly swap their correspondence lessons for the opportunity to mix with a group of friends every day.

Yours sincerely, Paul le Cerf, Oxley Park, NSW.

UNCLASSIFIEDS

AERIAL POTATOES wanted urgently, willing to pay your price. Needed for planting now, or will buy already sprouted plants of any size. Some yams also required, advise. P. Gill, P.O. Box 848, Nambour, Qld. 4560. Phone (071) 476649.

—

WIND GENERATOR 'Winco' heavy duty 12V-450 W, with tower and improved voltage regulator. In good condition. See it in operation. $950. J. Oliver, Box 65, St. Helens, Tasmania 7216. Phone (003) 761740.

BIRDS IN THE GARDEN

Gardens for Native Birds

John Dengate

National Parks and Wildlife Service, Printed by The Gould League of NSW, 1982, booklet, 10 pages, illustrated. Price $2. 00 posted from National Parks and Wildlife Service, GPO Box 2626, Sydney, NSW 2001.

Garden Birds

Attracting Birds to Australian and New Zealand Gardens

Clifford B. Frith

Doubleday, Sydney, 1986, hardback, 160 pages. Price $24.95.

"It's not hard to attract native birds to your garden in most areas", says John Dengate, "but it does take some planning. Birds need food, water and shelter before they will inhabit an area. Both food and shelter can be provided by native trees and shrubs, while water can be made available directly. Most birds eat either nectar, insects, seeds, berries or a mixture of one or both."

Both these books cover gardens and birds. John Dengate's is delightful, though brief — you could read it at a sitting — with some colour photos of native birds. It's excellent value at $2.00.

Clifford Frith's much bigger book is delightfully produced and considerably more expensive. It includes a directory of 100 garden birds and many colour photos. It could double as reference to identify birds and learn about their habitats and habits.

BIRD FEED

(Recipe from Taronga Park Zoo)

1 part sugar
3 parts baby cereal
10 parts water
some parrot seed

1 tablespoon makes a nectar which will attract native birds to your garden.

The recipe for this mixture was picked up during John Dengate's regular Tuesday morning broadcast on ABC Radio 2BL with Margaret Throsby.

THE BUSH

ANU 1987 Summer School

At the Kosciusko National Park: **Nature and landscape photography,** January 7-9; **Kosciusko: Knowing and managing the environment,** January 11-16 (includes history of the Snowys, landform, geology, alpine wildflowers, fauna and park management).

At Kioloa Field Station, South Coast: **Rainforests of southern NSW,** January 18-21 (field trips to examine distribution of various rainforest types).

At the ANU: **Native plant identification,** January 19-23 (includes collection, preservation and identification of plants, with two days at Kioloa Field Station, South Coast).

- Brochure and application form available from Centre for Continuing Education, ANU, GPO Box 4, Canberra, ACT 2601. Phone (062) 492892.

SMALLHOLDINGS

Australian Small Farms Handbook

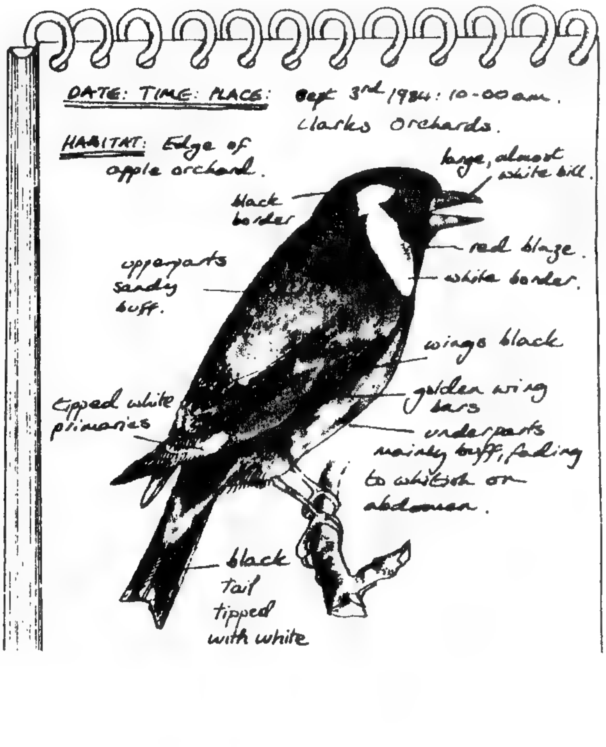
Services . Supplies . Equipment

Compiled by Mark Pearson

Second Back Row Press, Leura, NSW, 1986, large format soft cover, 170 pages. Price $12.95. From Second Back Row Press, P.O. Box 43, Leura, NSW 2780 (add $1.50 postage).

Revised, updated and and expanded from the 1984 edition, the Australian Small Farms Handbook is a kind of *Book of Lists* or *Yellow Pages* containing addresses and contacts on any subject a smallholder is likely to need.

Where to get products like pumps, wind generators, solar cells, seeds, livestock (bees, earthworms and poultry) and stock feed, organic supplies as well as chemicals and fertilisers; information on breeding deer or growing nuts; courses in farming skills; helpful groups and organisations like Agriculture Departments, Permaculture groups, growers' associations, breeders' societies and pony clubs. Listings cover every state. Useful books and magazines (like *Earth Garden*) are reviewed and there's a calendar of Small Farm Field Days and Shows.



DATE: TIME: PLACE: Sept 3rd 1984: 10-00 am. Clarks Orchards.
HABITAT: Edge of apple orchard.
large, almost white bill.
black border
red blaze.
white border.
upperparts sandy buff.
wings black
golden wing bars
tipped white primaries
underparts mainly buff, fading to whitish on abdomen.
black Tail tipped with white

PRAYING MANTID

ORGANIC GROWING

Small scale farming and horticulture

Some theories and strategies for organic growers

Jeanette Conacher

Organic Growers Association W.A. (Inc.), Wembley, W.A., 1986 (2nd edition, revised), paperback, 75 pages. Price $4.20 (plus $ 1.00 postage) from OGAWA, P.0. Box 213, Wembley, W.A. 6014.

A thorough, well researched and soundly based outline of the theory and practice of organic growing (sustainable agriculture if you prefer) for market gardens, nurseries, orchards or small farms in Australia.

Jeanette Conacher discusses the basis of organic farming and clearly and succintly explains the methods, such as organic fertilisers and various types of composting (including municipal composting in China). There are recipes for safe pesticides and wealth of facts, figures and references. Recommended.

APACE PUBLICATIONS

Real Food: wholefoods and how to prepare them, Felicity Shooter, APACE, AUD & ATDG, Perth, 1985. Price $4.00 posted.

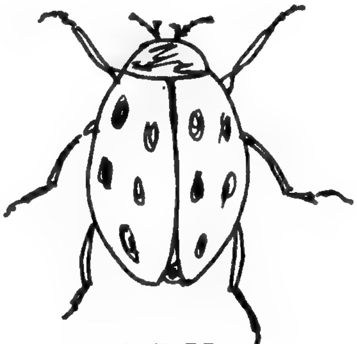
Modifying your home for energy efficiency: a simplified booklet for assessing your home's energy saving potential, and how to achieve savings, Rex Campbell, APACE, ATDG & Murdoch University, Perth, 1984. Price $2.00 posted.

Home comfort: An Australian guide to do-it-yourself insulating and weather-sealing, Deborah Wildash, APACE, ATDG, Perth, 1984. Price $5.00 posted.

Information sheets

Single and double page leaflets on **Mudbrick mould** (2/84), **Fruit fly trap** (1/85), **Rammed earth formwork design** (2/85), **Greenhouse design** (1/84) and others. Price 20 ¢ each, plus postage.

From APACE W.A., The Appropriate Techgnology Decelopment Group Inc., Winter House, Johanna Street, North Fremantle, W.A. 6159.



LADYBIRD

ETHICS

The Australian Non-Buyers Guide

Booklet, $5.00 from P.0. Box 368, Lismore, NSW 2480.

A 'Guide to positive shopping' for ethical shoppers, which lists the domestic products of the nuclear industry, environmental destruction and South African trade. *This Product costs the Earth* stickers are included.

HOMEBIRTH

Survey of Australian homebirth parents

Questionnaires from P.0. Box 107, Lawson, NSW 2783.

A national survey is being conducted by Hilda Bastian of *Homebirth Australia* to find out who gives birth at home and why they choose to do so. Anyone who has planned to give birth at home in the last few years can participate, including those who transferred to hospital in labour and whether or not the birth was attended by a midwife.

RADIONICS

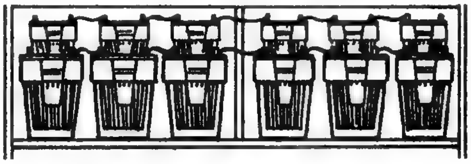
The Secrets of Radionics

A practical guide to subtle energy systems

Peter Nielsen

Issue 1, Maggies Farm, 1986, booklet, 8 pages. Four issue set subscription is $7.00 from Maggie's Farm, P.0. Faulconbridge, NSW 2776.

All matter radiates! This first issue of four explains the background of radionics — the harmonic scales and unseen energy forces heard in the past by tuning wood, stone or metal; caught today by psionic devices with electronic circuitry, crystals, magnets and coils.



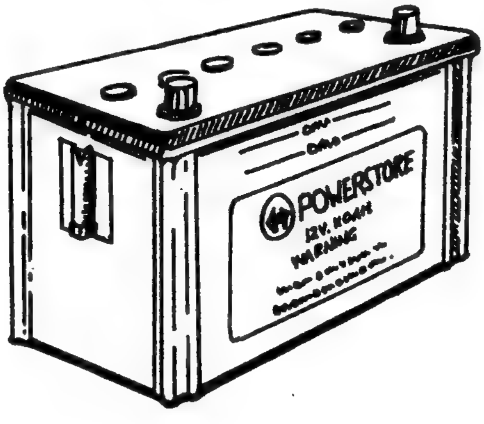
Energy

Powerstore batteries & inverters

1986 Product Catalogue, $3.00 posted from Self Sufficiency Supplies Pty. Ltd., Shop 3, Crn. Clyde & Forth Streets, Kempsey, NSW 2440.

With the sudden closure of the Besco factory in Sydney this October, you might be searching for batteries suited to solar energy systems. These 12 V and 6 V deep cycle batteries use low antimony in the positive plate and some calcium in the negative plate.

Four models of the Powerstore inverter range will convert 24 V, 32 V, 48 V and 110 V DC into 240 V AC to run washing machines, kitchen appliances, telecision, computers and power tools. The inverter also acts as a battery charger in reverse.



FOOD

CSIRO food storage leaflets

Did you know that tomatoes are best stored in a pantry cupboard or on a bench at room temperature and should not be kept refrigerated for more than four days?

A valuable series of leaflets about food and food storage. When to shop for fresh foods, how to choose the best produce, handle and keep perishable foods (and at what temperatures); preserve your own citrus juices; storage life and nutrition of frozen, canned and dried foods; avoid food poisioning; identify food additives by the codes on bottle and can labels; how to buy fresh, frozen seafood and ocean and freshwater crustaceans.

Free from: Consumer Liasion Section, CSIRO Division of Food Research, P.0. Box 52, North Ryde, NSW 2113.

The nutritional value of processed foods

History of food preservation

Storage life of foods

Handling food in the home

Handling and storage of fresh fruit and vegetables in the home

Temperatures for tomatoes

Identifying Food Additives

How to handle chicken — fresh or frozen

Milk & cheese and all that

Citrus juices — How to preserve your own

Seafoods: Hints on buying, home freezing & preparation

Fish from Australian waters

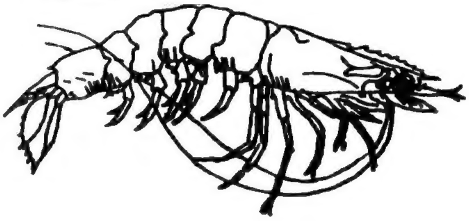
Australian Molluscs: Oysters, scallops, mussels & pipis, abalone, squid, octopus & cuttlefish

Prawns: Fresh and frozen

Australian crustaceans: Lobsters, crabs & freshwater crayfish (includes the yabbie)

Fruit and vegetables are not dead foods like bread and meat but are living things that breathe much as we do, and they can be suffocated by being deprived of oxygen if enclosed in a sealed, airtight container. After harvest they are cut off from continued replenishment of nutrients and essential water. These losses are not made up, so the produce is now perishable and at the mercy of the environment; deterioration has commenced.

E.G. Hall, Handling and storage of fresh fruits in the home.



A fresh whole fish should look good; the eyes should be full and bright and not dull or sunken; the skin should have a good coloration characteristic of the species and not a 'washed out' look. The gills of very fresh fish are bright red and fade with age. The gills of stale fish are brown and those of spoiled fish are grey... Fresh whole fish, fillets and cutlets have the mild smell of the sea. Stale fish have a strong 'fishy' odour. Spoiled fish have an unpleasant ammonia-like smell which will be quickly recognised.

Fish from Australian waters

PERMACULTURE

The Best of Permaculture

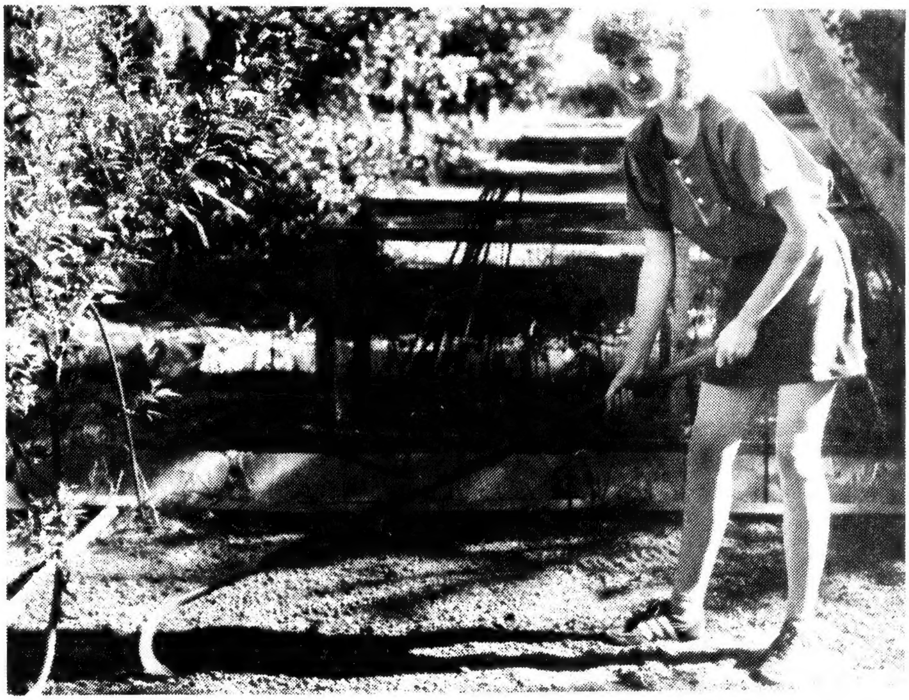
A Collection

Max O. Lindegger & Robert Tap

Nascimanere, Nambour, Qld., 1986, large format soft cover, 136 pages, illustrated. Price $12.50, plus $1.50 postage from Nascimanere, 56 Isabella Avenue, Nambour, Qld. 4560.

This selection of articles published in various journals and newsletters runs through the wide green field of foodscapes, city farms, urban forests, biological growing and building and specific tree crops that is Permaculture. The names include Masonubu Fukuoka, Bill Mollison, David Holmgren, Gil Wahlquist, Max O. Lindegger, Ian 'MacYabbie' Carstairs and Jean Giono ...

Many readers will be shocked to know that Jean Giono's character Elzeard Bouffier (*The Man Who Planted Hope*) was invented by the author. To prove that life is stranger than fiction, this short story, which has led to millions of trees being planted all around the world, is reprinted here. Jean Giono died in 1970.



Garden Tools

Bio-grubber

Price $10.00, including post and packing, from Harry Kurth, PO Box 561, Atherton, Qld. 4883.

Harry Kurth found the Bio-grubber (pictured above) being used all over Germany and had 200 made here on his return to share with organic gardeners in Australia. Like a cross between a tyne and a hoe, the curved blade of this tool requires little effort to aerate garden topsoil without disturbing the soil structure.

Dear friends,

We'd like to introduce you to Alan and Camille Thomas, the new publishers and editors of Earth Garden.

We chose them to take over from us because they have the practical editorial and production skills and the youth and enthusiasm needed to take on the task of bringing EG out regularly and maintaining its standards. They have their own farm and hope to move there permanently one day. At the moment Alan is a journalist in Melbourne and that is where Earth Garden will be based from January 1, 1987.

Their first move is to make Earth Garden a bi-monthly, starting with EG53 in February 1987. To encourage subscribers, they are offering a bargain rate of $13.00 for six issues (EG53-EG58) for subscriptions received before December 31, 1986 (that's only $2 more for two extra issues!).

We will continue to handle mail orders for back copies and books here at Epping, NSW, until December 31. From then on, all orders, stories, land lines and letters should be sent to Alan and Camille at P.O. Box 188, Moreland, Victoria 3058.

Subscribers are sustainers!

Irene & Keith.

Your new editors. Alan and Camille Thomas with their son Tane.

BOOKS & ISSUES

EARTH GARDEN, PO Box 378, Epping, NSW, Australia, 2121

Until December 31, 1986 only.

BOOKS

ENERGY WORKS! — $19.95 .... $............
Third Earth Garden Book — $5.50 .... $............
The Settler's Guide — $15.95 .... $............
HARD TIMES HANDBOOK — $8.50 .... $............

MAGAZINES

1986: EG49-EG52 — $11.00 .... $............
The lot: EG1-EG52 (excludes EG13) — $90.00 (save $25.00) .... $............
Single issues: EG45-EG52 — $2.75 each .... $............
EG33-EG44 — $2.50 each .... $............
EG26-EG32 — $2.25 each .... $............
EG22-3 & EG25 (Access) — $2.50 each .... $............
EG1-EG12/EG14-EG21/EG24 — $2.00 each .... $............
Total enclosed $............

Name ....
Address ....
....**Postcode** ....

No need to cut this page, just send us the details in a letter if you prefer.

1987 SUBSCRIPTION

New address: EARTH GARDEN, PO Box 188, Moreland, Victoria, 3058

Please post me my 1987 subscription (6 issues, EG53-EG58).
I enclose:
☐ **$13.00 (if received by December 31, 1986).** ☐ **$15.00 (from January 1, 1987).**

Name..

Address ....

....**Postcode** ....

Back copies

EG1: Move out . . . food co-ops . . . Kibbutz and Moshav . . . Montsalvat . . . herbs . . . Fred Robinson . . . bean sprouts . . . compost and mulch . . . comfrey . . . earthworms.

EG2: Start a garden . . . Neil Douglas . . . Keyline system . . . Kiewa farms . . . drying and storing food . . . hydroponics . . . recycling garbage . . . nutrition.

EG3: Herbs . . . compost . . . fast fertiliser . . . all about goats . . . mudbricks . . . domes . . . water wheel . . . bread . . . salads . . . pottery . . . spinning . . . vegies.

EG4: The honey bee . . . back to the land in Tassie . . . the transition . . . black sheep . . . tanning . . . candles . . . bread . . . donkeys . . . a wall-hanging.

EG5: The wind — windmills . . . windpumps . . . generators . . . raku pottery . . . Cinva ram . . . poultry . . . Hamburghs . . . moon planting . . . fallout shelter . . . vegan way.

EG6: Solar 1 — sun cults . . . solar cooker . . . sundials . . . Lost World . . . Clifton Pugh . . . concrete house . . . Shalom . . . Cajun cookin' . . . horses . . . spirit of Nimbin.

EG7: Solar 2 — hot water . . . Mudbrick techniques . . . Angora goats . . . make a leather bag and belt . . . mushrooms . . . natural dyes.

EG8: Gas power — methane digester . . . by truck to Tassie . . . cumbungi hats . . . inkle loom . . . candles and tapers . . . country cottages . . . A-frame . . . school gardens . . . sourdough.

EG9: LP gas . . . Mary's place . . . building with stone rubble (slipform) . . . macrobiotics . . . oats . . . ducks . . . rug frame . . . how to kill a pig.

EG10: Granite house . . . geese . . . chip heater . . . bamboo flutes . . . build beehives . . . Jarrah shingles . . . mudbricks . . . Bio-dynamics . . . seaweed . . . tandem . . . Index (EG1-10).

EG11: Water — hydraulic ram . . . waterwheels . . . okra . . . seed primer . . . heavy horses . . . tomatoes . . . soft technology . . . wine . . . hard cheese . . . start with hens.

EG12: Keeping food — drying . . . salting . . . bottling . . . storing . . . tahu . . . tropic delights . . . plant propagation . . . plans for a solar water heater . . . solar stills and cooker . . . Moora Moora.

EG13: OUT OF PRINT.

EG14: Self-sufficiency — gardens for all . . . Botobolar vineyard . . . Terania Creek . . . millet . . . Robinson Crusoe . . . Walden . . . The Nearings . . . stone building.

EG15: A Lytel Herbal — growing and using herbs . . . text and illustrations from the classic 16th C herbals . . . modern commentary . . . Index to EG15.
EG16: A Lytel Herbal (Part 2) — comfrey, lavender, wormwood, yarrow . . . poultry shed . . . peafowl . . . goats . . . basic beekeeping . . . rammed earth building . . . hydraulic ram.

EG17: Fencing . . . dry stone walls . . . make soap . . . nets . . . pole shelter . . . breeding black sheep . . . The Autonomous House . . . asparagus . . . Aeolian harp . . . ducks . . . Khaki Campbells.

EG18: Fruit garden . . . oranges . . . lemons . . . olives . . . nuts . . . tropical fruit . . . fodder trees . . . road building . . . wood fired kiln plans . . . Cinva-ram cottage . . . sunflowers . . . homebirth.

EG19: Wood heat — pot bellies . . . Jotul . . . cooking . . . making a quid . . . build a storage cellar . . . bushfires . . . stonefruit . . . macadamia nuts . . . binding your EGs . . . tree planting . . . budding.

EG20: Apples . . . pears . . . cordon and espalier . . . build a haybale pig house . . . pollen . . . rose hips . . . mudbrick flats . . . solar homes . . . gourds . . . preserve fence posts.

EG21: Womancraft — all articles by women . . . earthly arts . . . axewomanship . . . glove puppets . . . spinning . . . weaving . . . easy rugs . . . Sumatran house . . . old roses . . . Index (EG10-20).

EG22-23: Australian Access Sourcebook . . . 150 pages . . . Aborigines . . . organic growing . . . permaculture . . . earth building . . . wind . . . solar . . . water power . . . technology . . . water supply . . . access to groups, plans, books, tools.

EG24: Place — 24 new settlers write . . . Mare Carter . . . Ron Edwards . . . Neil Douglas . . . Gundaroo Store . . . Rainbow Region . . . Mt Oak . . . Moora Moora . . . Universal Brotherhood . . . bush ashram.

EG25: Australian Access Sourcebook (Part 2) — 130 pages . . . livestock . . . aquaculture . . . fencing . . . killing . . . tanning . . . food and nutrition . . . grain grinders . . . solar homes . . . methane . . . greenhouse . . . Dorothy Hall.

EG26: The earth-built kasbahs . . . owner built homes in stone . . . timber . . . mudbricks . . . a slab cottage . . . tree felling . . . solar electrics . . . acorns . . . compost dunny . . . quandong . . . pumpkin recipes.

EG27: 100 tropical food plants for Australia (part 1) . . . 16 legumes . . . winged bean . . . pigeon pea . . . lablab . . . cowpea . . . adzuki bean . . . blacksmithing . . . bluestone building . . . wok cooking.

EG28: Tropical food plants (part 2) . . . horse and buggy . . . packhorsing the Alps . . . black sheep . . . Merinos . . . bullocks . . . tamarillo . . . stringybark baskets . . . solar trike . . . persimmons.

EG41: Sahara . . . Timbuktu . . . Uganda . . . pack donkeys . . . horse float journey . . . mat-tents . . . build a S-rotor wind generator . . . damper . . . yeastless bread . . . food co-op accounts . . . real potatoes. . . Index, EG31-40.

EG42: Earth covered homes . . . Burra dugouts . . . slipform stone . . . the flood-defensive house . . . tomato tips . . . deep ecology . . . build a pigsty . . . EG reader survey . . . the Tuareg . . . Jean Pain's methods.

BACK ISSUE LIBRARY

All the back copies, from 1972 to 1986 (EG1 to EG52, except EG13). ☐ $90.00 posted. A survival kit of self-reliance, the 'big packet' (5 kg) has 3,100 pages of practical information on growing, building, energy, household economy, livestock, craft and tucker and tales from New Settlers all around Australia.

EG29: Mudbricks — the monastery at Stroud . . . Bob's bonza brickmaker . . . earth floors . . . curved walls . . . herb roof . . . cutting axe . . . low energy design . . . coconut mats . . . mangoes . . . tropical food plants (part 3).

EG30: Organic growing — compost heaps, pits, trenches, boxes, bins and barrels . . . no-dig . . . mulch carpets . . . semi-arid growing . . . preserving figs . . . tempeh . . . pasta . . . glass bottle windows.

EG31: Energy — make a hydraulic ram . . . second-hand windpump . . . mudbrick sequels . . . freezing food . . . zucchini glut . . . drying fruit . . . all about sprouts . . . hot box cooker . . . building a log house (part 1).

EG32: Year of the Tree — St Barbe Baker . . . tree tales . . . how a tree works . . . farm tree . . . native from seed . . . coppicing . . . Neil Douglas interview . . . cob building . . . log house (part 2).

EG33: Tenth anniversary issue . . . timber felling . . . lifting poles . . . post and beam design . . . log house (part 3) . . . parquet floors . . . backyard rabbits . . . goats . . . fowls . . . dry pit loo . . . portable henhouse.

EG34: China — communes . . . trees . . . fish farming . . . recycling human wastes . . . biogas . . . transport . . . travel notes . . . Chinese earth building (Ron Edwards) . . . rainforest . . . bread and jam.

EG35: Bees and trees — tribute to St Barbe Baker . . . backyard bees . . . mudbrick workshop . . . footings for earth walls . . . make a solar collector . . . magpies . . . earthworms . . . fodder trees.

EG36: Retrn to Nimbin . . . new settlers . . . a woman builder . . . pawpaw plantation . . . solar electric systems . . . potty garden . . . choughs . . . Peru . . . lavender sachet . . . biological building . . . farm structures.

EG37: HARD TIMES . . . making paper . . . newspaper fuel . . . rags to rugs . . . barter . . . slush lamps . . . sawdust stoves . . . Depression dodges . . . hand grain mills . . . 120 household hints.

EG38: Hard Times tucker . . . bread . . . soups . . . yoghurt . . . no-meat meals . . . beer . . . electric grain grinders . . . Gujarati village . . . mudbrick hermitage . . . earth walls and bushfires . . . Noel's island.

EG39: Build Peter Pedal's bike wheel wind generator . . . fire without matches . . . bushfire defensive house . . . avocado growing guide . . . rosehips . . . car battery power . . . farm energy . . . backyard food.

EG40: Communities . . . running a food co-op . . . three in a caravan . . . Scott Nearing's a good life . . . cyder in Tasmania . . . our self-built house . . . earth floors . . . the billy . . . olive oil . . . hares . . . cashew nuts.

EG43: Earth domes and vaults . . . rendering earth walls . . . quarry bush stone . . . bush shower . . . Peter Pedals' incinerator hot water and Pelton wheel . . . low voltage wiring . . . sheep . . . donkeys . . . horses.

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EG48: Bob Rich's rammed earth primer . . . 1930s Dab, Pug and Pise, compost muncher . . . sushi and sashimi . . . Energy Pulse . . . buying an energy system . . . animal shelters . . . hand dug wells . . . ferrocement tank . . . growing firewood.

EG49: Chlorella culture . . . Solar Pack . . . Peter Pedals' TARDIS . . . just 6 volts . . . Poll Herefords . . . Babaco . . . Genteel frugality . . . Evening Primrose . . . home-made ladders . . . ferrocement roofs . . . building blues . . . immersion heaters . . . HARD TIMES hints . . . Soper with Chaucer.

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In our last issue

EG51: Australian solar kit homes . . . self-sufficient house . . . solarium . . . energy updates . . . thin film solar panels . . . ram & sun pumps . . . two-faced stonework . . . river stone & mudbrick . . . earth building access . . . kero refrigeration . . . a shunt regulator . . . vegie basics . . . corn is king . . . 3-ply spinning . . . loo review . . . Genteel frugality (part 2) . . . ginger beer for gourmet . . . let's look at bread . . . home schooling.

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